FEBRUARY 1950

Plant Engineering

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Volume 4, No. 2

The magazine that helps plant engineers with their everyday problems

YOU CAN BE **SURE**.. IF IT'S

Westinghouse

HOW LONG

will the Life-Line bearing last?

As long as comparable periodically lubricated bearings—or longer!

BEARING MANUFACTURERS SAY: "Pre-lubricated bearings have the same life expectancy as periodically lubricated bearings *IF those periodically lubricated bearings are perfectly maintained.*" But how often is a bearing perfectly maintained? Not often enough! That's why Life-Line pre-lubricated bearings offer fewer motor outages due to lubrication faults.

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Get all the facts on Life-Line motors. See for yourself how much you can save. Ask your Westinghouse salesman for copies of "Facts on Pre-Lubricated Bearings," (B-4378) and "Motor Costs" (B-4321), or write Westinghouse Electric Corporation, P.O. Box 868, Pittsburgh 30, Pa.

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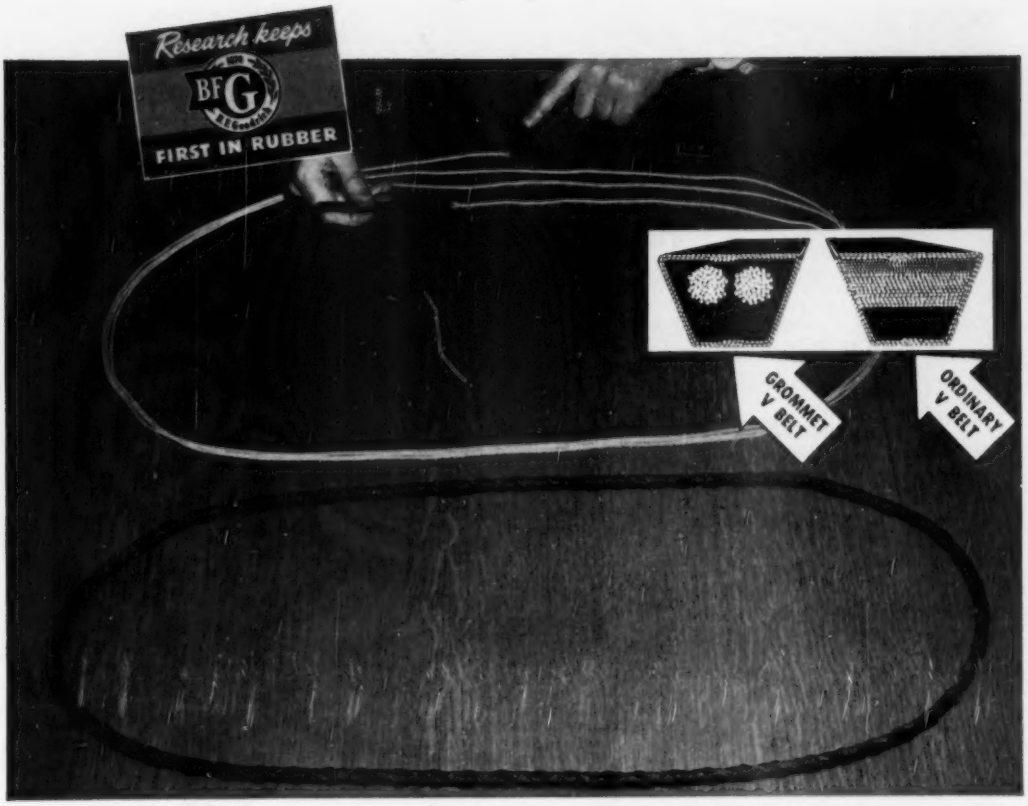
INDUSTRY'S LEADING MOTOR



How to eliminate most of your V belt cord failures

B. F. Goodrich grommet V belts last 20 to 50% longer, cost no more

IF YOU are now using ordinary V belts, most of your cord failures occur in the overlap section, where cord ends are joined. B. F. Goodrich grommet V belts use *endless* cord grommets, thus do away with the overlap section, eliminate the cord failures that normally occur there. That's one reason why BFG grommet belts last 20 to 50% longer, though they cost *not one cent more!* Here's the whole grommet story —

No cord ends — A grommet is endless, made by winding heavy cord on itself to form an endless loop. It has no overlapping ends (as in an ordinary V-belt cord section), no stiff, weakened section of "spliced" cord. Because most of the failures in ordinary V belts occur in the region where cords overlap, the endless cord section in a grommet V belt eliminates such failures.

Concentrated cord strength — All of the cord material in a B. F. Goodrich grommet V belt is *concentrated* in twin grommets, positioned close to the driving faces of the pulley. This eliminates "dishing" of cords in the center of the belt, insures full use of all cord strength, maximum power delivery, even load distribution. No layers of cords to rub against one another and generate heat; cord and adhesion failures are reduced.

Better grip, less slip — Because a grommet is endless, free of stiff overlap, a grommet V belt is more flexible, grips the pulleys better. Size for size, grommet V belts will give ⅓ more gripping power, pull heavier loads with a higher safety factor.

Only B. F. Goodrich has the grommet! — Twin grommet construction is an exclusive, patented B. F. Goodrich feature — no other V belt is a grommet V belt. (U. S. Patent No. 2,233,294) To get genuine grommet V belts (at present made in D and E sections only) see your local B. F. Goodrich distributor. Ask him to show you his "X-ray" belt that illustrates grommet construction clearly. *The B. F. Goodrich Company, Industrial and General Products Division, Akron, Ohio.*

Grommet V Belts BY
B.F. Goodrich

PLANT ENGINEERING

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'Round About with the Editors

Plant Engineering on Microfilm for Libraries

TECHNICAL PUBLISHING COMPANY has entered into an agreement with University Microfilms, Ann Arbor, Michigan, to make available to libraries issues of Plant Engineering in microfilm form.

One of the pressing problems facing all types of libraries today is that of providing adequate space for a constant flood of publications. Periodicals pose an especially difficult problem because of their bulk and number.

Microfilm makes it possible to produce and distribute copies of periodical literature on the basis of the entire volume in a single roll, in editions of 30 or more, at a cost approximately equal to the cost of binding the same material in a conventional library binding.

Under the plan, the library keeps the printed issues unbound and circulates them in that form from two to three years, which corresponds to the period of greatest use. When the paper copies begin to wear out or are not called for frequently, they are disposed of and the microfilm substituted.

Sales are restricted to those subscribing to the paper edition, and the film copy is only distributed at the end of the volume year.

The microfilm is in the form of positive microfilm, and is furnished on metal reels, suitably labeled. Inquiries concerning purchase should be directed to University Microfilms, 313 N. First Street, Ann Arbor, Michigan.

Roy T. Jewell Dies

Roy T. Jewell, 57, superintendent of Maintenance at the Dodge Manufacturing Corporation, Mishawaka, Indiana died January 1 after an illness of three years. Mr. Jewell was superintendent at the Dodge plant for 14 years.

Recent Plant Engineering Changes Around the Country

Walter Simon recently was appointed plant engineer at the Paraffine Companies, Inc.'s Emeryville, Calif. plant.

J. R. Ward is now plant engineer of the du Pont Company's Wilmington, Del., shops.

A. A. Seipel recently was appointed plant engineer of Celanese Corp. of America's Plastics Division plant in Newark, N. J.

John E. Morrison formerly plant engineer, construction engineer and construction superintendent of: Aluminum Company of America; Bylesby Engineering & Management Co.; and the Minneapolis-St. Paul Sanitary District, has been appointed District Manager of Link-Belt's District Office in Duluth, Minn. He is a registered engineer and a graduate of the University of Minnesota, 1922.

Fred R. Allin assumed the duties of plant engineer at Wadsworth plant of Ohio Match Co., Jan. 1, reports J. M. Neath, superintendent.

Revision of Thermocouple Tables

AN EXTENSIVE project is now under way at the National Bureau of Standards for revision of all the common thermocouple tables in order to take into account the recent changes in electrical units and in the International Temperature Scale. Present plans call for the publication during 1950 of eight tables giving the temperature-emf relations for platinum-platinum rhodium, chromel-alumel, and copper-constantan thermocouples.

The temperature-emf tables for thermocouples previously issued by the Bureau have been widely used in science and industry, not only to convert thermocouple voltages into the equivalent measured temperatures but also in the preparation of purchase specifications for thermocouple wire and in defining the relation between impressed emf and scale reading for pyrometers which indicate temperature directly. Recently, however, in accordance with international agreement, the Bureau adopted the absolute electrical units and began using the definitions of the new International Temperature Scale of 1948 both in its own research program and in calibrating instruments for other laboratories and industries. Revision of the thermocouple tables was then advisable in order to make them consistent with former usage.

In the preparation of the tables, emphasis is being placed on convenience for use. Thus, the explanatory text will be short, the numerals will be as large as practical, and the layout of pages and headings will be arranged to facilitate interpolation. The argument will be presented at one-tenth the interval given in the original tables. Inverse tables, formerly lacking, will also be included. Each table, together with its inverse, will be issued as an NBS Miscellaneous Publication and, when announced, will be available from the Superintendent of Documents, U. S. Government Printing Office.

"You rarely have to repair **this** steam trap mechanism"

YOU SAVE TIME AND MONEY

THE Armstrong hardened chrome steel valve opens wide and closes tight — with a snap! This eliminates throttling and consequent wire drawing. The Armstrong free-floating lever mechanism is almost frictionless. The bucket and valve lever assembly are 18-8 corrosion resistant stainless steel. The mechanisms of Armstrong steam traps for low and medium pressures are identical in materials and workmanship to those used in Armstrong traps for pressures to 1500 psi, 900 F.

There is nothing in an Armstrong trap to bind, stick, collapse or leak. *Now is the time to quit working for your steam traps and buy the traps that will work for you.* Call your nearby Armstrong representative today.

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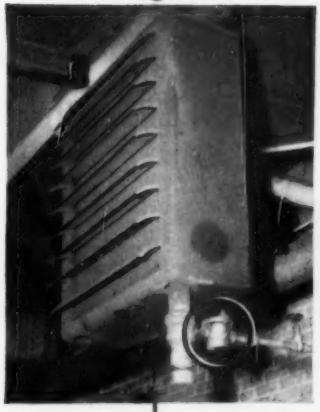

50% SAVINGS IN MAINTENANCE since installing Armstrong steam traps on the heating system at *John Deere Ottumwa Works, Ottumwa, Iowa.* This is typical of reports from Armstrong users.

THE 36-PAGE ARMSTRONG STEAM TRAP BOOK contains complete data on the design, operation, selection and installation of Armstrong steam traps for all services. Send for your free copy.

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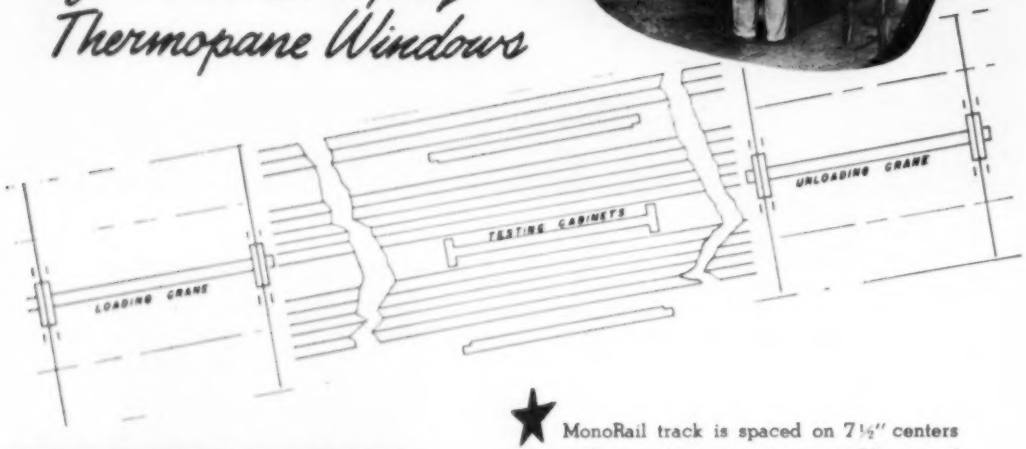
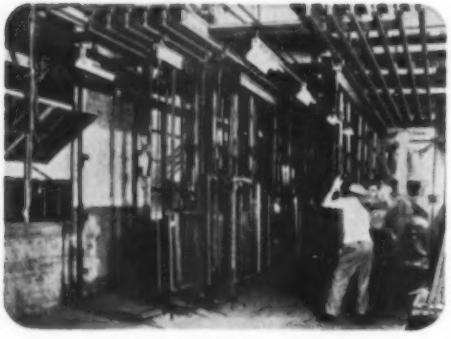
Permits Close Spacing of Tracks Carrying Thermopane Windows





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TOLEDO, OHIO

★ MonoRail track is spaced on 7½" centers with interlock with cranes to permit 12 rows of Libbey-Owens-Ford Thermopane windows to enter testing cabinets. Empty carriers are transferred from MonoRail crane across interlock to loading track. From loading through testing cabinets, carriers travel a distance of 121 feet. Track interlocks with crane in unloading area—empty carrier is returned by gravity on three tracks. From the simplest hand-operated unit to the most complicated fully automatic system, American MonoRail engineers can suggest a system best suited to your problems that will save you money.

THE AMERICAN MONORAIL COMPANY

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Good Outdoor Lighting Will Pay Dividends Too

The reasons for good lighting inside a plant are well known and accepted. The employee who works outside needs light as much as the man who works inside. The better he can see, the better he can work. Better light means less errors, greater safety, and increased production.

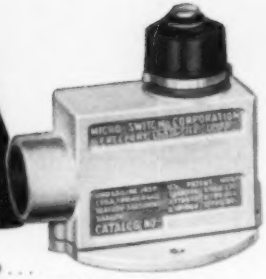
If the outdoor lighting around your plant was developed haphazardly—a bare bulb here, an old "dishpan" reflector there—it probably does not give you light where you need it, in the quantities you need. Adequate outdoor lighting can pay you dividends in increased efficiency and better materials handling.

Good outdoor lighting is not difficult to plan, nor is it expensive. Equipment is simple, easily installed, modest in cost. To help you with your planning, General Electric has just prepared a booklet, "Outdoor Lighting for Industrial Plants." It is GEA-3640B. A copy is yours for the asking. *Apparatus Dept., General Electric Co., Schenectady 5, N. Y.*

GENERAL ELECTRIC

451-141

MICRO PRECISION SWITCHES for Production Short Cuts

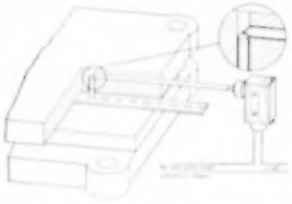


MICRO . . .
first name in precision switches

There are unlimited uses for MICRO precision switches in every plant. MICRO products are provided with housings and mountings to meet every type of industrial need. They may be actuated by cams, dogs, slides or other actuation.

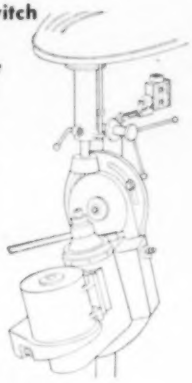
Below are shown a few ways in which plant engineers are using MICRO precision switches to make equipment more automatic and reduce production costs. "MICRO TIPS," published regularly, offers ideas on many production short cuts. Available on request.

1 MICRO Precision Switch used as safety on progressive die



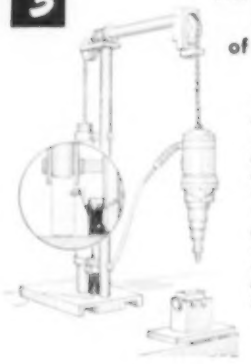
A miscut cannot damage this die. If stock is not fed close enough for pilot punch to pick it up, a rod operates the MICRO die cast enclosed switch. This closes the solenoid brake circuit and stops the press. It is operating on presses with 1" to 3" stroke at 130 strokes per minute.

2 MICRO Precision Switch operates to brake motor shaft automatically



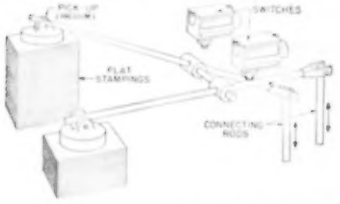
Loading and unloading of this lens grinder is speeded up by this device which decelerates the spindle from 600 rpm to 0 in two seconds. Pulling down the quill operating lever trips the MICRO precision switch. This energizes the solenoid which releases the brake. Returning the lever to the starting position de-energizes the solenoid, allowing spring pressure to force the brake shoe against a small drum on the motor shaft. Result is higher production and greater safety for the operator.

3 MICRO Precision Switch controls operation of Electric Screw Driver



The counterbalance of the driver depresses the roller leaf actuator of a MICRO precision switch. This opens the circuit and shuts off the motor when the screw driver is elevated on the pulley. When the screw driver is pulled down toward the work, the balance weight is lifted (see insert), closing the circuit and starting the motor.

4 MICRO Precision Switch signals when stamping supplies are low



This device indicates when but 35 stamping blanks are left in the clip of this assembly machine. When the supply is low, the MICRO precision switch is actuated and closes circuit to sound buzzer and flash a light. Four such loading arrangements are used on an assembly machine.

MICRO SWITCH Distributors with complete stocks are located in ninety cities to supply you with just the right switch to make your plant operations more automatic. Look them up under "Switches, Electric" in your local classified phone book or write:

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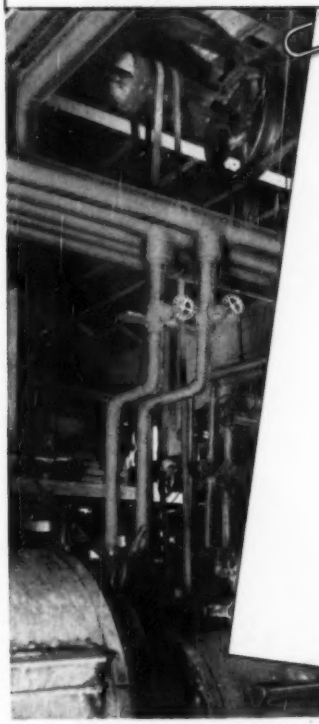
No. 2

Quick Quiz

on Copper Piping



Q *Why does it cost less to pump through copper tubing than through piping made of other metals?*

A Because the smooth, corrosion-resistant bore of ANACONDA Copper Tubing stays smooth. Deposits don't build up to impede the flow.

Q *Can you pipe steam, oils, refrigerants, gases and other chemicals—as well as water—through copper tubing?*

A Yes—practically every industry in the country has installed copper tubing for these purposes. In addition, it's simpler to install ANACONDA Copper Tubing; it takes less room, is easy to dismantle, and can be soldered or brazed.

Q *Can you use smaller pipe sizes when installing copper tubing than when installing other kinds of piping?*

A You certainly can—the smooth bore of ANACONDA Copper Tubing prevents the accumulation of rust and deposits which in ordinary piping reduces the volume and speed of flow.

Q *Are there any other important ways in which copper tubing does a better piping job?*

A Lots—and you ought to know about them. They are all explained in the new edition of "ANACONDA Copper Tubes for Industrial Applications." If you don't have a copy of this valuable booklet with its many illustrations and data tables, write today for Publication C-24. The American Brass Company, Waterbury 88, Connecticut. In Canada: Anaconda American Brass Ltd., New Toronto, Ontario.

For better Piping...use **ANACONDA**
COPPER TUBES

Worn Out ?

not with NI-ROD in the shop!

Badly worn cast-iron cam. The first beads of Ni-Rod have been laid.

The problem: When this large cast iron cam wore out, it laid up a power shear in the sheet metal plant of McGruer, Fortier, Meyers, Ltd., Montreal, Canada.

Their maintenance men found that the minimum replacement time for the cam would be three weeks. To get the shear back in service sooner, they decided to try repairing.

The solution: The worn camming surfaces were built up with Ni-Rod* and subsequently machined to contour. The Ni-Rod deposit thus formed the new wearing surfaces.

Result? The power shear was back on the job within *3 days* instead of 3 weeks!

This is a *typical* Ni-Rod story — sound, strong, machinable welds in cast iron. Preheating is seldom required. Ni-Rod's easy-to-control arc facilitates cast iron repair work; cuts overhead on tough assignments. It works on both A.C. and D.C.

Check Ni-Rod's superiority in your own shop. Order a 5-lb. package from your nearest INCO distributor. Available in 3/32", 1/8", 5/32" and 3/16" sizes.

*Reg. U. S. Pat. Off.

Worn surfaces have been built up with Ni-Rod.

Cam, after machining. Ni-Rod deposit now forms the wearing surfaces.

THE INTERNATIONAL NICKEL COMPANY, INC., 67 Wall Street, New York 5, N.Y.

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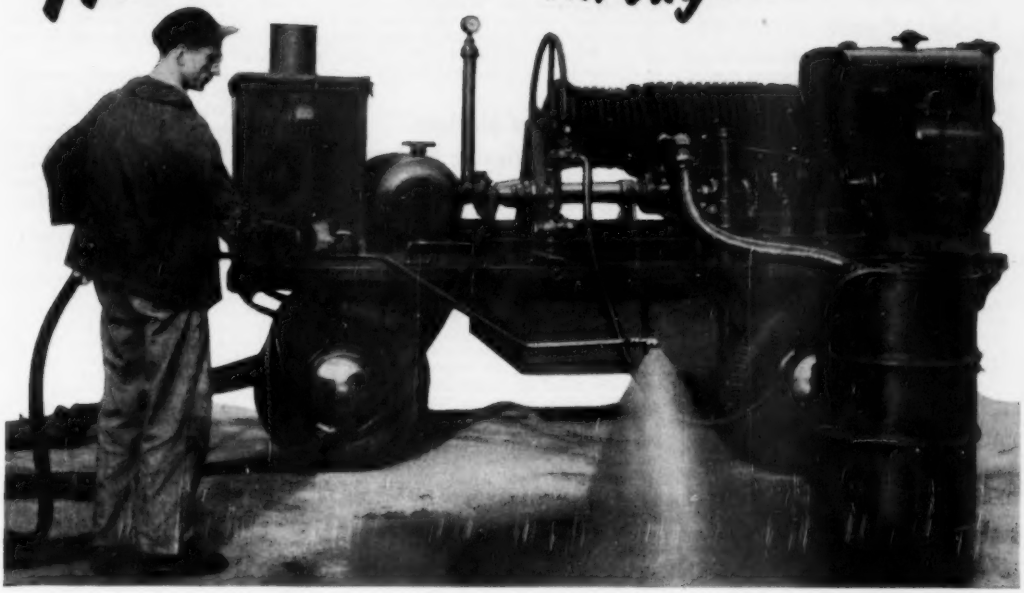

Here's the Pump that Does the "Impossible"

● What *other* pump could do this: move "cold-application" roofing from container drums through 180′ of pipe coil for heating, then to the roof through 400′ of 1″ high-pressure hose—and *still* have sufficient force for spraying? *Moynos* are doing it every day on machines like that above.

It's the Chausse Roofers Spray, made by W. G. Chausse Co., Detroit. Handling 15 g.p.m. at pressures of 200 to 250 p.s.i., it sprays *faster* than men can spot and unroll the felt. And, in the morning, after standing idle many hours, it *clears* the hose without difficulty.

AMAZING PERFORMANCE. Moyno's "progressing-cavity" action is *truly amazing.* It self-primes; creates nearly perfect suction vacuum; delivers positive pressure without pulsation; reverses by reversing rotation. Moynos pump *virtually anything* that will push through a pipe—pass solids in suspension; resist chemicals, abrasives—stand up and *keep going* where other pumps have failed.

If you think all this sounds *too good* to be true, call in your Moyno Man. Or write for Bulletin P-30-E. We'll be *glad* to mail it free.

WHAT CAN IT DO FOR YOU?

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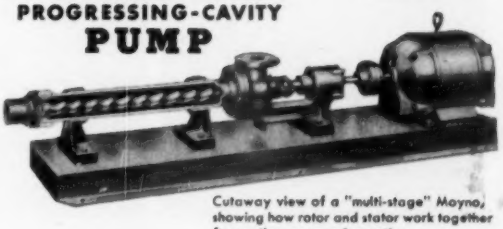
MOYNO®
PROGRESSING-CAVITY
PUMP

NO PISTONS
NO VALVES
NO HIGH-SPEED IMPELLERS



Cutaway view of a "multi-stage" Moyno, showing how rotor and stator work together for continuous pumping action.

ROBBINS & MYERS, INC.
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SPRINGFIELD 99, OHIO • BRANTFORD, ONTARIO
MOTORS • FANS • MOYNO PUMPS • FOUNDED 1878

Plant Engineers' Digest

When Special Finishes are Needed to Combat Corrosions

CORROSION may be due to many kinds of chemical action necessitating special formulas to meet specific needs. Long laboratory research is frequently required in the formulation of coatings to protect surfaces against various acids, gases, fruit, vegetable and other food juices, and unusual or extreme erosion.

Certain factors which require the application of specially formulated coatings are:

Severe corrosive conditions—The protective life of a paint system may be short, due to: 1. Chemical or electro-chemical attack including alkali formation at the cathode; 2. mechanical attack, such as abrasion, impingement, cavitation and flexing.

Engineering factors—The engineering mechanism may require that the metal suffer little or no corrosion, because corrosion would lead to premature failure through stress corrosion or corrosion fatigue. A high speed, high torque propeller tail shaft is a good example of metal operating under such conditions.

Economic factors—These depend upon the design of the structure and should repair become necessary due to corrosion, considerable expense would be involved due to the inaccessibility of the corroding part. Steel piling, underground pipe lines, stern tube shafts and the underwater areas of a ship's hull are good examples.

Another economic factor to consider is where shutdown of equipment must be avoided and yet would be necessary to repair corrosion damage. Ships' rudders, struts, overhead discharge valves and fire mains are examples in the marine field, while pump impellers are classical causes of shutdown in chemical plants. *From By Gum, a publication of Reichold Chemicals, Inc., Detroit 20, Michigan.*

Chemical Feed Methods for Air Conditioning Systems

PROPER APPLICATION of chemical treatment to the water in air conditioning systems is essential if satisfactory results are to be secured economically. In most systems the chemicals for scale and corrosion control should be fed continuously, whereas the toxicants for slime and algae control should be fed intermittently. However, in certain systems, intermittent application of the corrosion inhibitor is satisfactory and in some cases the continuous feed of the toxicant is necessary. Fortunately, a variety of chemical feeding equipment is available to meet the requirements for any system.

Continuous Feed — A continuous method should be employed for feeding chemicals for scale and corrosion control in open chilled water systems, air washers, cooling towers, evaporative condensers, direct humidifying systems, and in cooling systems using water on a once-through basis.

Continuous feed of treatment can take the form of a simple gravity feeder, which consists of a suitable tank with bottom takeoff and control valve for regulating solution discharge. This method of feed does not deliver treatment at a constant rate because of lowering head, and in addition, some attention is required to make certain that the flow is continuous as foreign materials may plug the discharge needle valve. However, the feeder is readily fabricated and inexpensive and therefore is widely used.

To secure a positive method of continuous feed, a small motor driven, controlled volume pump should be employed.

When treating once-through systems a proportional method of feed must be employed. Where the rate of water flow is fairly constant, the controlled volume pump can be employed. Where a variable rate of water flow is encountered, the double orifice type proportional feeder can be used to advantage.

Intermittent Feed —An intermittent method of feed should be installed for feeding chemicals for slime and algae control to open type chilled water systems, air washers, cooling towers, and evaporative condensers. Sterile conditions in these units can not be economically maintained and the intermittent method of adding treatment is

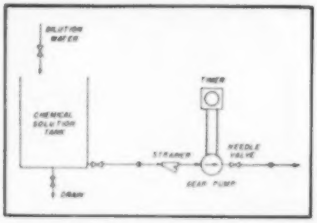


Fig. 1. One layout consists of a small gear or centrifugal pump, timer controlled, to inject treatment at specified intervals

Loading Dock Remodeled to Allow Freight Cars to Come Inside Out of the Rain

Remodeled loading dock along the rail siding now permits railroad cars to come right into the building for loading. The recently completed extension merely raised and extended the roof of the enclosed dock and added a wall on the other side of the tracks. Construction was of sheet metal siding over a wooden frame. At left above, a portion of the old roof can be seen in the background as well as stringers and posts for the new roof in the foreground. Enclosing the freight cars makes the dock warmer in the winter and eliminates the former hazards of water running between the dock and the freight cars when it rained, making it difficult to load the cars, and of ice forming on the walkways beside the doors. Center above, shows details of construction of the new outside wall as workmen nail on the metal siding. Right above, is an overall view showing how the shape of the building has been changed by the shiny new metal roofing. (From Maytag Bulletin, Nov. 17, 1949, a publication of The Maytag Company, Newton, Iowa.)

ERIEZ

MAGNETIC AGE

Issued periodically in Erie, Pennsylvania, by the Eriez Manufacturing Company, Producers of Magnetic Equipment.

FACTORY MUTUAL NOW OK's THREE ERIEZ SEPARATORS

Far out in front in the development of magnetic separators for textile use, the Eriez Manufacturing Co. now has several products which bear the Associated Factory Mutual Stamp of Approval. Today the Eriez Magnetic Pulley, Magnetic Pump Separator, and Spiked Apron Magnets, using the Eriez Standard, Jumbo, FX, and Giant Magnets, are fully sanctioned for installation in textile, bedding and bat-making plants.

Approval covers use in conventional textile fiber opener-picker lines as well as in direct feed lines in which fiber passes directly over spiked aprons to feeders, garnetts, and cards.

Eriez representatives are factory-trained experts in the installation of permanent non-electric magnetic separation equipment. Call on them, or Circle No. 1 on coupon and mail to Eriez for more information.

ERIEZ MAGNETIC SEPARATORS PROTECT MERCKENS CHOCOLATE

Processing men with a ferrous contamination problem would have their eyes opened by a visit to the Pierce Division of the Merckens Chocolate Company in Buffalo. Here a very difficult tramp iron separation problem is solved easily and economically with a variety of Eriez magnets.

Cocoa beans from the warehouse are first cleaned by air, then passed over Eriez plate magnets to remove rust scale and tramp iron. At the cracker and fanners the material receives another plate magnet cleaning. From here the shelled beans pass through a gravity chute to a third Eriez separator, a magnetic drum. This third cleaning means "3 times and out" for iron contamination.

For more information circle No. 5 on coupon below and mail to Eriez.

MAGNETS KEEP WALLS UP AT OHIO CHEMICAL PLANT

A northern Ohio chemical plant built its walls so that they burst out slightly when explosions occurred . . . as they did up to 9 times a day. Though there usually was fire, destruction was thus somewhat reduced.

It was known that tramp iron in the chemical ingredients was the troublemaker. Separation methods failed until Eriez Magnetic Separators were installed. The plant manager reports not a single explosion since. More data can be had by circling No. 6 on coupon at the right and mailing to Eriez.

SMALL MAGNET, BIG JOB AT BUFFALO FEED MILL

The Black Rock Milling Company at Buffalo, New York, is protecting the expensive dies in its four pellet mills by trapping tramp iron with one 24" Eriez plate magnet. The magnetic equipment is installed directly ahead of the storage bins so all grain being stored for processing must pass over the face of the magnetic separator.

Protection against iron contamination of feed, and against fire hazard is also offered grain mills by use of properly engineered magnetic separation equipment. For details circle No. 7 on the coupon and mail.

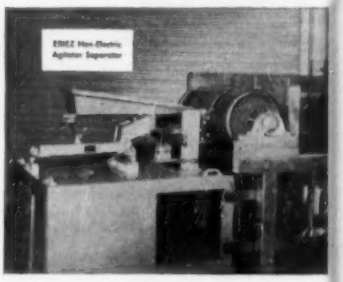
AGITATOR SEPARATOR SOLVES TOUGH SEPARATION PROBLEMS

The new Eriez Non-Electric Agitator Separator is designed to separate small amounts of non-magnetic material from large amounts of magnetic material.

The project may be the recovery of valued magnetic materials from non-magnetic waste, as in the recovery of steel grindings from abrasive grit after steel billets are surface-ground. It may be the recovery of non-magnetic chemicals from fine iron or shot after ball-mill operations. Sometimes it is merely the separation of fine magnetic scrap from non-magnetic cuttings when it is desired to recover both.

The difficulty in this type of separation in the past has been the trapping of non-magnetic material among the magnetic particles as the latter are drawn into the magnetic field. Eriez has surmounted this difficulty by effecting physical separation by agitation before the material reaches the most powerful areas of the magnetic field.

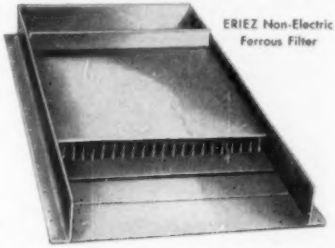
About 90% of the magnetic material is withdrawn from the material in process as it reaches the first stage of the feeder. The remaining 10% drops through the feeder with the non-magnetic material but once again passes the lower face of a magnetic pulley at which point virtually complete separation is effected. For complete information circle No. 4 on the coupon and mail to Eriez.



MAGNETIC FILTER TAKES IRON FROM LIQUIDS AND POWDERS

Many manufacturers are plagued with the problem of removing iron from liquid and powder products to prevent spoilage and machinery damage.

The Eriez Non-Electric Ferrous Filter solves this problem. It is highly effective where an iron-free end product must be made. The Ferrous Filter is portable and comes in different sizes and magnetic strengths. For more data circle No. 3 and mail coupon below to Eriez.



DO YOU GET MAGNETIC AGE?

The Magnetic Age is our quarterly house organ. Our customers tell us they like it because it's readable, like your paper.

A typical issue contains installation stories, technical articles and some human interest material. A word to us will put you on our mailing list. Fill out coupon, put a ring around No. 2 and mail.

Eriez will display magnetic equipment for the textile industry at the American Textile Machinery Exhibition in Atlantic City, May 8 through May 12.
Engineers will be available to answer questions.

ERIEZ MANUFACTURING COMPANY
204 State Street, Erie, Pa.

Name _____

Street _____

City _____ State _____

Company Name _____

1 2 3 4 5 6 7

50-B

employed to bring about control of organic growths.

In cooling tower systems and in evaporative condensers the organic growths do not usually accumulate rapidly, and the application of the toxicant once or twice per week proves sufficient. In these cases the toxicant is usually dissolved and poured into the system at a convenient point.

However, in open chilled water circuits and in air washers, the organic growths accumulate rapidly. Furthermore the water capacity of these systems is usually small and a fairly rapid displacement of the water takes place from over-flow or blow-down. These two factors require that the toxicant be fed in frequent shots. In some cases additions of treatment as frequently as every four hours are necessary. For these conditions intermittent application of the treatment by an automatic shot feeding arrangement is most convenient. See Fig. 1.

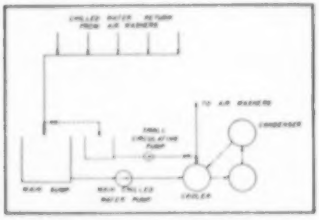


Fig. 2. Chemical treatment by-pass system used in one plant to simplify feeding and control

Figure 2 illustrates the changes made at one plant to simplify the feeding and control of chemical treatment during the humidifying season. In this case, a small sump tank and circulating pump were installed and the piping arranged to by-pass the cooler so that the water could be continuously circulated.

This setup permits one central point for feeding the chemicals as well as for securing samples for control purposes. *From The Betz Indicator, Sept., 1949, a publication of W. H. & L. D. Betz, Philadelphia 24, Pa.*

Precautions with Fungicides

Because of the extensive use of fungicides in industrial finishing, following is an outline of certain precautions which are advisable in handling such coatings.

First, it should be stated that in a dry state these finishes are non-toxic to human beings; but when wet, they are more or less toxic, depending upon the individual's own skin condition. 1. Apply fungicides in a well-ventilated booth or room. Otherwise wear a mask. 2. Avoid contact with the skin. If necessary wear neoprene or neoprene-impregnated cotton gloves, or use skin cream. 3. If the skin is contacted, wash with warm water and soap. 4. If taken internally, give an emetic such as mustard or soap in warm water, followed by white of egg. Call a doctor. *From The Coating Corner, Vol. II, No. 12, a publication of Brooklyn Varnish Mfg. Co., Inc., Brooklyn 1, New York.*

Factors Affecting Electrical Insulation Life

One of the most important of all factors which enter into the reliable functioning of electrical apparatus is the insulation. When it fails, the machine goes out of service until it can be repaired or replaced.

The failure of electrical insulation is usually the result of mechanical breakdown rather than electrical; that is, such factors as ageing and deterioration, overheating, and the action of oil on the insulation lead to the eventual breakdown rather than purely electrical forces.

There are a number of factors which affect the life expectancy of insulation and these should receive the careful consideration of persons responsible for the operation of electrical equipment. These factors include: Misapplication, High Operating Temperature, Vibration, Lightning or Line Surges, Overloading, Lack of Cleanliness, Improper Lubrication, Care of Control Equipment, Care of Idle or Spare Equipment, and Careless or Negligent Operation.

Misapplication—In selecting a motor for a drive, consideration should be given to the location of the equipment, which in many instances will determine the class of insulation as well as its proper treatment. The application should be properly engineered to avoid overloading and the motor should be designed with sufficient starting torque for the job.

Improper selection of a motor may result in severe punishment to the windings. Heavy load surges on a motor not designed for such surges may cause coil distortion, insulation abrasion and end-connection failures. Insufficient starting torque may cause eventual winding failures due to excessive temperatures resulting from long starting periods.

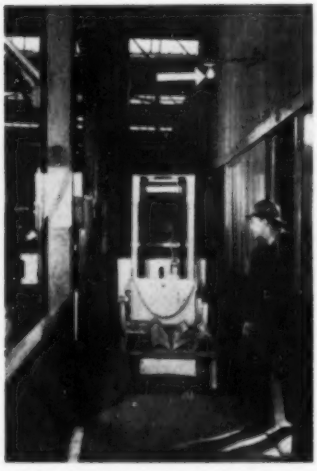
High Operating Temperature — This condition is frequently caused by overloading, high ambient temperature, dirty windings, restricted ventilation, faulty operation of blowers or fans used for cooling, single-phase operation or loose connections. High operating temperature causes insulation to become dried out or brittle which usually results in the coils becoming loose in the slots. This in turn permits movement of the coils and eventual failure of the windings due to abrasion of the coil insulation.

Overloading—There are two important factors that must be observed in the operation of electrical machinery. One is the nameplate capacity rating, the other the permissible temperature rise. Neither should be exceeded.

Overloading, furthermore, is harmful in more ways than mere thermal deterioration of insulation. There may be increased conductor expansion and higher insulation stresses that will lead to failure of the insulation. It is important, therefore, that nameplate ratings be observed both as to capacity and temperature, rather than temperature alone.

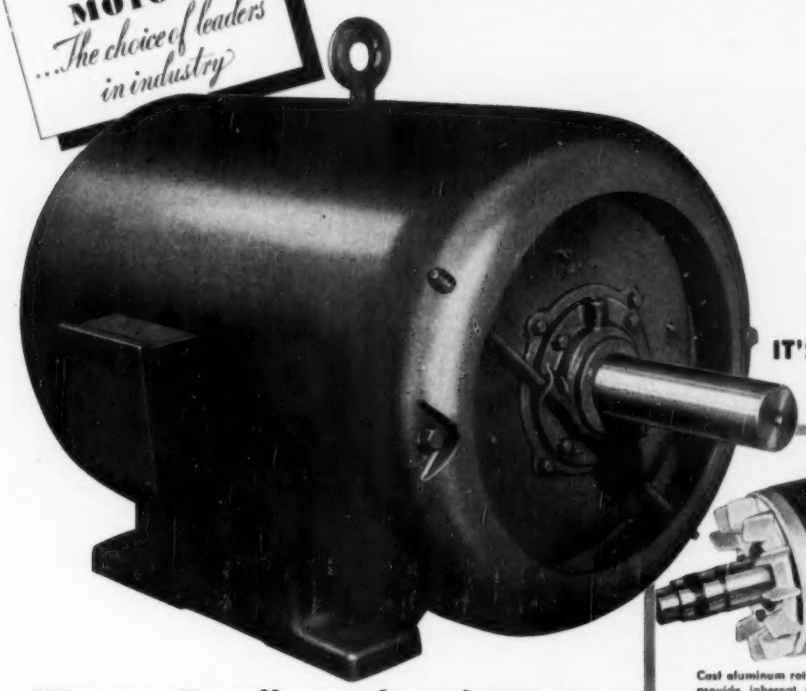
Lack of Cleanliness—Lack of cleanliness is very harmful to electrical insulation. Dirty windings result in higher operating temperatures than clean windings and the life expectancy of the insulation is thereby shortened. Furthermore, the practice of allowing oil, grease or any other foreign material to collect on the windings of an

Safety Devices in Steel Mill Operations

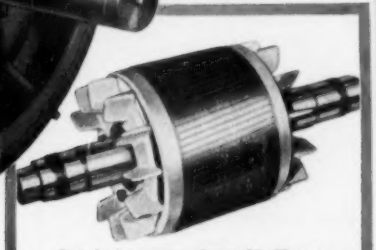


Left: After installing portable guardrail, repairman rides "spreader" of crane on daily inspection of wire cables. Right: Opening a door into this corridor in a fabricating shop automatically lights red bulb overhead. Buggies must stop dead, giving worker right-of-way. (From an article by Pat Jarman in Steelways, Nov. 1949, a publication of American Iron & Steel Institute.)

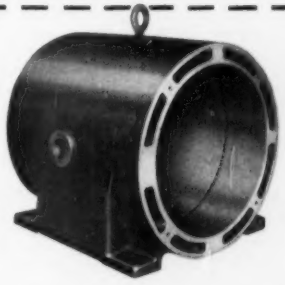
WAGNER MOTORS
...The choice of leaders in industry



IT'S WAGNER *because:*



Cast aluminum rotors, pioneered by Wagner, provide inherent mechanical and electrical characteristics that add quality and dependability to Wagner type CP Motors.



The rugged frame, used on Wagner type CP Motors, has extra large air ducts around the entire stator to prevent clogging and to permit plenty of fan-driven air to cool the motor.

Wagner Totally-enclosed Motors *best* for really dirty jobs!

Wagner totally-enclosed fan-cooled motors are designed for a particular purpose—to operate efficiently and safely under conditions that would quickly damage an ordinary open type motor. In really dirty jobs—in atmospheres filled with dust, fumes, moisture, abrasives, steel chips and other harmful elements—these *protected* Type CP Motors keep on working, delivering dependable power with no maintenance other than periodic lubrication. Wagner totally-enclosed fan-cooled motors are varied electrically to suit a wide variety of application requirements.

Bulletin MU-185 gives complete information on Wagner Motors. Twenty-nine sales and service branches, in principal cities, are ready to help you on any motor problem. In addition, almost 500 authorized motor repair shops provide speedy, nationwide service facilities.

Wagner Electric Corporation EST. 1891

WAGNER ELECTRIC CORPORATION
6492 Plymouth Ave., St. Louis 14, Mo., U.S.A.

ELECTRIC MOTORS • TRANSFORMERS • INDUSTRIAL BRAKES
AUTOMOTIVE BRAKE SYSTEMS — AIR AND HYDRAULIC

BRANCHES IN 29 PRINCIPAL CITIES

MU-9

electrical machine may cause accelerated deterioration for reasons other than increased operating temperature.

Improper Lubrication — A regular lubrication schedule should be established for the various machines, and in this way not only can many bearing failures be prevented but many insulation failures as well.

Vibration—There have been a number of instances where the vibration of the fan has become so violent that the driving motor has been wrecked, and although this is an extreme result, the continuous vibration of a rotating machine will usually cause at least an insulation failure.

Lightning or Line Surges—Insurance statistics show an improvement with respect to lightning or line surges as a cause of insulation failure, and whereas a few years ago some 25 per cent of insulation failures were attributable to lightning or line surges, the figure today has dropped to about 10 per cent. Credit is due to some extent to improvements that have been effected in many lightning arrester grounds, and it is also believed that the installation of capacitors with arresters is a favorable factor.

Care of Control Equipment—Many insulation failures are due to single-phase operation as a result of faulty control equipment, and this is true for large machines as well as small ones. The contacts of oil circuit breakers should be checked regularly and the dielectric strength of the oil maintained by avoiding dirt in the oil and overheating of the contacts with resulting carbonization. The interrupting capacity of all circuit breakers should be adequate for the circuit conditions, but in many instances this point is overlooked. Inadequate interrupting capacity is not only a hazard to the machine but to human life as well.

Care of Idle or Spare Equipment—Attention must be paid to the maintenance of idle or spare electrical machines in order that they may be in safe operating condition when their use is required. In this connection, it is especially important to keep the windings clean and dry. If idle electrical apparatus is located in a humid atmosphere the insulation resistance should be checked before the machine is placed in service. If the resistance is low, the machine should be thoroughly dried out, and cleaned, before it is used.

Careless or Negligent Operation—Exact procedures for operation should be established, and checked frequently, so that it may be reasonably certain that operators are performing their duties properly and that they are giving the right attention to equipment entrusted to their care. *From an article by J. B. Swering, in The Locomotive, July, 1949, a publication of The Hartford Steam Boiler Inspection and Insurance Company, Hartford 2, Conn.*

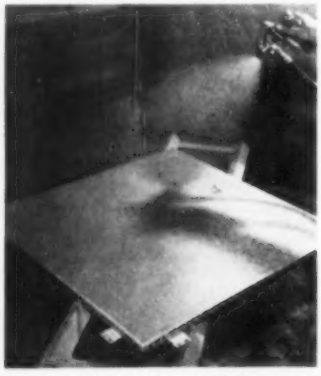
New Building "Fronts" with Special Clip Feature

THAT NEW, modern, attractive appearance on many industrial buildings is the result of "fronting" made up of steel panels. However, there was one potential source of trouble in the design of the individual panels. Each panel is affixed to a building by means of two to eight spot-welded clips, made of ordinary sheet steel and coated to prevent rust. The clips must be adjusted as the construction of a building goes along, and this frequently involves sharp bending, hammering and twisting. As a result, the coating is sometimes fractured or even partly knocked off. In this way, a starting point for rust stains might be created.

It soon developed that the material chosen for the clips would need more than just resistance to corrosion. The manufacturing processes involved in making the porcelain-enameled panels imposed their own requirements. The metal had to be easily welded, resist scaling and oxidizing in the 1600 F enameling furnace, and also not lose its strength at this elevated temperature.

The alloy finally selected for the clips was Inconel. The first Inconel-equipped panels were installed in 1946, and present indications are that this nickel-chromium-iron alloy is rendering highly satisfactory service. These clips have proved fully rustproof as well. *From Inco, Vol. 23, No. 3, a publication of The International Nickel Co., Inc. New York 5, N. Y.*

The clips, after being welded to the panels, are adjusted as required to install the panels plumb and true, then securely fastened to the steel furring



Every portion of the panels is covered with an architectural porcelain enamel finish or coating, including the backs and flanges; it is baked on at 1600 F

Maintenance of Antifriction Bearings

IT IS impossible here to deal with specific maintenance problems, but there are simple basic rules which, if observed, will insure the user of the equipment long, uninterrupted, carefree bearing life.

Dirt—Experience has shown that dirt is responsible for most failures. There are two classes of such dirt: 1. Abrasive, such as emery, dust, or sand. 2. Obstructive, such as metallic chips or sawdust.

Cleaning—There is a great temptation when removing a bearing for cleaning to spin it to see how it runs or sounds. This spinning is ruinous to the bearing for the dirt can easily drop into the races, scratching the balls and raceways, shortening life expectancy of the bearing accordingly.

In cleaning the bearings put them in a clean container. Kerosene may be used for cleaning, although carbon tetrachloride is preferred. If the bearing is quite dirtcaked, it may be necessary to soak it for 24 hr and to use a short-bristled brush to loosen the foreign material in it. Swish the bearings in the cleaner and, while submerged, revolve it by hand to remove all grease, oil, or dirt.

After cleaning, rinse it in clean solvent, dip it in light oil (as solvents such as tetrachloride leave surfaces quite susceptible to rust). Always lubricate immediately after the bearings have been cleaned and washed to prevent rusting.

Installation—In installing bearings to shafts and housings where a prior bearing has functioned, it is necessary to observe the following: 1. Make certain the bearing seat is clean—no burrs, roughness, or scoring—and that the shaft is not undersize. 2. Do not force a bearing which has not started squarely onto the shaft as it may scrape and damage the shaft. 3. Do not force a bearing onto a shaft by pressure exerted on the outer ring as there is risk of brinnelling the raceways. 4. The bearing, if new and just removed from its box and wrapper, should not be washed out. The slush or grease in a bearing was put there by the manufacturer for a definite purpose and is clean. *From a paper by J. M. Bruening, presented at the Annual Meeting of The American Society of Mechanical Engineers, 29 W. 39th St., New York, N. Y.*

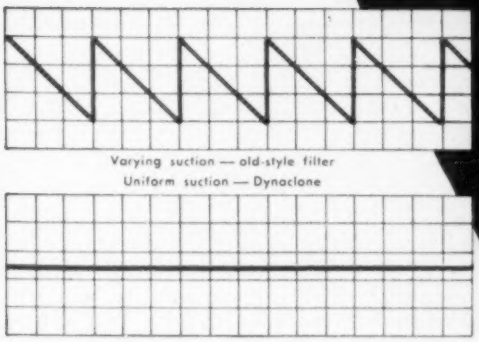
(Continued on page 33)

NEW! NEW!

NEW Cloth Screen Dust Filter

SLY DYNACLONE

offers 5 NEW ADVANTAGES!



Varying suction — old-style filter

Uniform suction — Dynaclone

1. Eliminates mechanical shaking.
2. Provides uniform suction at dust source.
3. Assures longer bag life . . . 4. minimum maintenance.
5. Keeps itself automatically and continuously clean without additional power or equipment.

Send for descriptive bulletin just out on the new Sly Dynaclone — the ultimate in filter performance.

This revolutionary new dust filter is another Sly first. Extremely simple and thoroughly dependable, it eliminates entirely the gremlin of mechanical shaking and provides uniform suction of air at dust source.

This uniform suction is achieved by a simple device which cleans the filter bags successively by a reverse flow of air—the same suction which draws the dust onto the filter cloth is reversed to blow it off.

Since this reverse air suction operates continually, the new Sly Filter requires no shutdowns for removing dust from the cloth.

No mechanical shaking or flexing device is needed, eliminating all strain and wear on the filter bags.

The simplicity of design and operation and elimination of all auxiliary equipment for periodic cleaning of bags mean a saving of floor space and a very minimum of maintenance.

The result of long experimentation and exhaustive tests, the Sly Dynaclone has thoroughly proved itself. It provides substantial savings over any other type of cloth screen dust collection. Write for complete information.

*Patent Applied for

SLY PIONEERS and LEADERS in INDUSTRIAL DUST CONTROL

THE W. W. SLY MANUFACTURING CO.
4753 Train Avenue • Cleveland 2, Ohio
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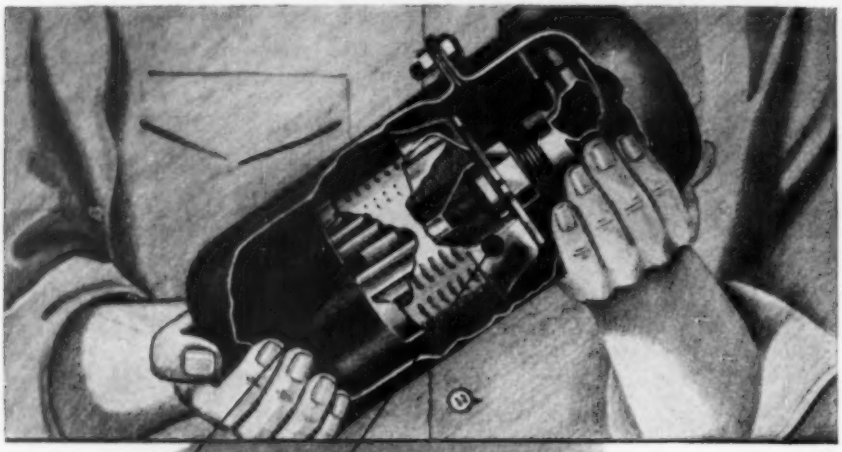
STAYNEW PIPE LINE FILTERS



ELIMINATE MOISTURE OIL DIRT PIPE SCALE from Compressed Air Lines

Tests prove that Staynew Filters often save their entire cost in just a few weeks. By preventing the passage of foreign matter, including moisture (water and oil), they prevent excess wear, costly freeze-ups, damage to materials and interference with processes.

EXCLUSIVE DOUBLE-ACTION PRINCIPLE PROVIDES:

MECHANICAL SEPARATION—Deflector Cup drives foreign matter to bottom of container where heavier particles are deposited.

FILTRATION—air or gas rises thru the original Radial Fin Insert which removes the lighter material.

DOLLINGER PROTECTIMOTOR STAYNEW FILTERS

IMPORTANT APPLICATIONS: Protection of Air-operated Tools and Controls • Paint Spraying • Sand Blasting • Air Displacement or Agitation of Liquids

COMPLETE DETAILS ON REQUEST

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Representatives in Principal Cities

Bulletins on Current Plant Problems

INSTRUMENTS AND CONTROLS

101 Low Cost Photoelectric Control—Bulletin P-2817 illustrates some industrial applications of automatic control—protecting, counting, door opening and others—which are possible with company's economical packaged photoelectric control. Also provides helpful selection data and specifications. Westinghouse Electric Corp.

102 Flow Meters—Illustrated Bulletin M-31 explains how automatic compensation for pressure or temperature variations, or both, are achieved in flow measurement of gasses or liquids with company's compensated meters. A schematic diagram shows how a corrected record is automatically and continuously produced, with the chart also showing uncorrected flow. Another diagram illustrates installation of a pressure and temperature compensated flow meter, and photos show the meters equipped for compensating functions. Hagan Corp.

103 Liquid Level Instruments—Illustrated Catalog 75, 24 pp, describes company's line of instruments for indicating, measuring and controlling liquid level and interface level. Pictured and described are magnetic tape-and-drum, electronically transmitting, ball-float, pneumatic and differential pressure units; V-notch weir and Parshall flume flow meter instruments; also chemical service sight gage glasses. Fischer & Porter Co.

104 Smoke Indicator—Illustrated Bulletin SR 1006 explains the economy of a photo-electronic smoke indicator, and includes diagram of an installation. Lists main features of the indicator and describes and illustrates a smoke violation indicator and additional bell for use with the unit. McNeill Engineering Co.

105 Thermostatic Regulator for Sprinkling Tanks—The economy of using this regulator on the hot water heater of a sprinkling tank to prevent waste by overheating is discussed in Bulletin 2032-1239. Includes photo of regulator and diagrams showing its application to steam lines serving various types of heaters. The Powers Regulator Co.

106 Insulation Testers—Bulletin 21-48 presents two megger insulation testers—a rectifier operated model and a dual-operated one for either manual or separate rectifier unit operation. Gives applications for both types and illustrates principle of operation, discussing selector switch features, ohmmeter, deflecting and control coils and guard system. Full specifications included, also facsimile scales. James G. Biddle Co.

107 Pressure Cell—Bulletin 366 describes and gives complete specifications for pressure cells of the resistance wire strain gage type, available in capacities from 300 to 50,000 psi. A wiring diagram and cross-sectional sketches of the cell and seal-off unit are included. Testing Equipment Dept., The Baldwin Locomotive Works.

HEATING

108 Automatic Steam Generator—Bulletin SC-36 features a compact, automatic steam generator. Photos and cutaway drawings, in color, show the generator, and text covers the advantages of this packaged unit, describing its three-pass induced draft system, feed pump and condensate return system, other design features, and controls. Specifications and dimensions included. The C. H. Dutton Co.

109 Return System—An explanation of the design and advantages of company's steam and condensate return system is provided in this bulletin. Illustrates model with single stage pump and model with two-stage pump and gives specifications for both. Presents system as one which eliminates losses and runs continuously, returning all steam and condensate to boiler at high pressure and temperature. Includes testimonials from users. Pioneer Mfg. Corp.

110 Heat Exchangers—Bulletin 120 illustrates and describes heat exchangers that are automatically cleaned at predetermined intervals. Features one of its industrial uses—as a white water heater in the paper making industry. Fully illustrated with photos of parts and assembly, also includes a table of dimensions and sizes. Explains design and construction features and discusses economy afforded by this heat exchanger. Davis Engineering Corp.

111 Deaerating Equipment—Generously illustrated with photos and drawings. Catalog 3005 places special emphasis on company's tray-type deaerators, but also describes and illustrates atomizing and cold water types, and hot water generators and deaerators, explaining their applications and advantages. Also covers special designs for unusual requirements, cast iron deaerators, metering deaerators, and accessories. Cochrane Corp.

MATERIALS HANDLING

112 Chain Conveyor Data—Bulletin PC12-1A-3 offers engineering and application data on a flexible chain bed conveyor system and is profusely illustrated with installation photos and layout drawings. Describes and illustrates power unit, link and swivel-link chain type, also regular and new channel bed frames. Includes full specifications and dimensions. Yeland Equipment Corp.

113 Portable Power Conveyor System—This bulletin features a combination power unit and piling conveyor and describes and illustrates, by sketches and photos, its use with other units. Discusses the power unit in detail, giving capacities and belt speeds, and lists available accessories. Food Machinery Corp.

114 Freight Elevator Buyer's Guide—How to integrate the selection of freight elevators with materials handling needs is one of the questions answered in Booklet B-4402, a 44-pp buyer's guide. Ten illustrated sections explain basic considerations involved as well as the component parts of freight elevators. These include determining lifting capacity and size; types of elevator control systems; determining method of door operation; layouts for standard freight elevators; determining type of elevator best suited to plant needs; budget price information, and typical and special installations. Sections on selection, layout, and applications use case examples to describe procedure. Freight elevator application and price curves included. Elevator Div., Westinghouse Electric Corp.

115 Car Puller Data—Featuring an electric capstan car puller and barge mover, illustrated Bulletin 644 presents specifications and dimensional data on the puller and illustrates its use. Also describes and illustrates several other electric and gasoline-powered capstans, wrenches and hoists. Silent Hoist & Crane Co.

116 Elevating Positioners—Three basic types of hydraulic elevating positioners are covered in Temporary Bulletin 440, which also describes several optional interchangeable attachments, showing positioners' adaptability to many types of jobs. Several installation photos are used to show how better positioning can simplify many jobs. Lyon-Raymond Corp.

117 Front-Boom Crane—Bulletin 73 describes, illustrates and gives specifications for a compactly-designed 5-ton capacity crane with front boom. Discusses applications and special features of the crane and pictures it at work. Also includes photos of other materials handling equipment. Silent Hoist & Crane Co.

118 Trucks for Industry—Gas and battery fork-lift trucks, gas powered towing and dump tractors, and attachments are presented in Illustrated Bulletin TO-57. Full dimensional specifications are included. Industrial Truck Div., Clark Equipment Co.

119 Trench Digger at Work—Filled with on-the-job photos, Bulletin KP296 features a portable utility trench digger mounted on pneumatic tires and built for one-man operation. Stresses the unit's controlled discharge, ability to dig close to foundations, and other advantages. Illustrates in detail complete assembly and parts and includes dimensions and condensed specifications. The Parsons Co.

120 Drum Handler—Bulletin 113-99-1144 illustrates and discusses the use of company's drum handler for raising and transporting drums, and agitating, dispensing or

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draining their contents. Includes specifications, instructions for use. Falstrom Co.

121 Lift Truck — Model views, action photos and descriptive text are included in Catalog 1136 which is devoted to company's new model 2000-lb capacity lift truck. Specifications and construction details of the new model are also presented, covering many of the basic changes in design over previous models. Hyster Co.

122 Hydraulic Handler—Bulletin LM-13 features a handler designed for economical lifting and dumping of liquids or solids into high level receptacles. Explains design and hydraulic operation of the handler and illustrates it in use. Includes standard specifications. Lee Metal Products Co., Inc.

123 Roller Chains—Double pitch roller chains for drive and conveyor service are catalogued and illustrated in Bulletin 60-S. Dimensions, weights and prices, and recommended working loads for conveyor service are included. Also illustrates methods of guiding double pitch conveyor chains and lists double pitch chain sprockets and standard attachment links. Baldwin-Duckworth Div., Chain Belt Co.

ELECTRICAL

124 D-C Generators—Twenty-pp Bulletin 0287220 describes the construction of units larger than 150 kw or 0.2 kw per rpm, including two and three-wire generators and exciters, both engine and coupled type. It also discusses the operation of shunt wound and compound wound generators in parallel, and supplies information on company's marine units. Includes description of "frog leg" armature winding widely used on motor-generator set generators of 100 kw and larger, synchronous converters of 200 kw and larger and large low speed generators. Allis-Chalmers Mfg. Co.

125 Good Ideas on Switches—Featuring a brief article on how a snap action switch can prevent breaking of shear pins, this bulletin contains many other helpful tips on the use of company's switches. It's Vol. I, No. 5, of a publication issued regularly and available to qualified plant engineers who request it. Micro Switch.

126 Standardized Control Centers—Booklet B-6213, 36 pp, discusses the safety features of company's new control centers. Includes sections on planning a control center, a table showing dimensions and weights of starter and other interchangeable units, such as circuit breakers, single-phase distribution transformers, and lighting panelboards. Also included are reference tables for selection of starter sizes. Westinghouse Electric Corp.

127 Switchgear for Mines—Illustrated Bulletin GEA 5426 offers data on sectionalized power distribution systems for mines. Includes a plan view of a typical mine, showing the use of company's sectionalizing and reclosing units. Describes and illustrates, by photos, the construction and design of these units, explains their operation, and provides dimensions, ratings. Apparatus Dept., General Electric Co.

128 Switches for Use in Explosive Atmospheres—Bulletin 51 features switches designed for use in such places as chemical plants, grain elevators, and refineries, as limits, safeties, interlocks, controls and indicators. Two available types are described and illustrated and their characteristics given. Micro Switch.

129 Electric Heating Units—Chromalox Catalog 50, 50 pp, presents company's line of standard electric heating units. The four basic units—strips, rings, tubulars and cartridges covering wide variations in wattage, voltage and sheath material—are listed, and complete assembled heating equipment is shown. Also included is application data on heat losses and calculation and selection data. Sketches are used to suggest solutions to several industrial heating problems. Prices and discount sheet included. Edwin L. Wiegand Co.

130 Splash Proof Motor—Bulletin 162A introduces a splash proof motor designed for use in locations subject to direct streams of water or other liquids. Streamlined design, ventilating system and rotor are illustrated and explained and other features listed. Bulletin also describes and illustrates several other types of motors. Sterling Electric Motors, Inc.

131 Rotating Electrical Equipment—Company's line of motors, dynamotors, motor generator sets, and generators are described and illustrated by photo in Catalog 48-1, as are diesel and gasoline plants. Includes construction details, ratings and specifications. Electric Specialty Co.

132 Carbon Brush Selection Data—Forty-pp of material helpful in determining the right type of carbon brush for a wide range of electrical machines is provided in Catalog B-48. Covers carbon and carbon graphite, electrographitic, graphite, and metal-graphite brushes, defines brush characteristics and explains use of fractional horsepower and industrial brushes. Characteristics, descriptions and applications for entire line of brushes is presented in tabular form. Also describes and illustrates shunt connections, split brushes, contact carbons, clips, and terminals, and includes suggestions for eliminating brush trouble and tips on ordering. The United States Graphite Co. Div., The Wickes Corp.

133 Small Bus Duct—Detailed information on a midget-size bus duct is contained in Bulletin 700. Illustrates entire unit, also strap and hanger. Text discusses major parts, design features. Includes list prices. Frank Adam Electric Co.

MECHANICAL POWER TRANSMISSION

134 Transmission Belting—Catalog Section 2100 on rubber transmission belting covers several types, all of which are pictured and described along with recommendations for use and specifications. Also outlined in detail and illustrated is the method of making belts endless by the "Flylock" belt joint. The B. F. Goodrich Co.

135 Flexible Shaft Couplings—Bulletin 19 features all-steel couplings of the double strand roller chain type, describing and illustrating their design and advantages. Gives specifications, dimensions and full selection data for determining right stock coupling. Also describes and illustrates company's revolving coupling coatings designed to permit installation or removal in space no longer than coupling itself, giving sizes, prices. Diamond Chain Co., Inc.

136 Adjustable Speed Drive—Bulletin D-2101 introduces a smaller, packaged adjustable speed drive built to operate on single-phase a-c power and available with ¾ to 2 hp motor. Tells purpose of the drive, explains and illustrates its operation and provides dimensions, prices, other ordering data. Reliance Electric & Engineering Co.

137 Unusual Applications of Roller Chain—Bulletin 66-S, 24 pp, suggests the broad application of roller chain by showing some of its less common uses. Each application is described, illustrated with photos and, in the case of complicated machinery, with simplified working drawings. Examples include the use of roller chain for revolving irregular forms, operating the traveling news sign in Times Square, and forcing drill bit into the earth. Chain Belt Co.

138 Variable Speed Drive Data—Engineering drawings covering vertical and horizontal assemblies of company's fractional horsepower motor drive without reducer, with single reducer, and with double and triple reducer are featured in Bulletin M-4917. Also includes speed variation tables to facilitate selection of correct drive, and discusses general characteristics of the line, mounting, motors, and control afforded. Reeves Pulley Co.

COMPRESSORS, PUMPS

139 Two-Stage Compressor—Data covering a precision-built two-stage, air-cooled compressor for wide industrial application is presented in this 16-pp bulletin. A chart which includes dimensions, cylinder arrangement and other factors, as well as photos, facilitates selection of 11 available sizes. Large cutaway illustrations show design details. Motors, lubrication, regulation, valves and other features are described and pictured. Joy Mfg. Co.

140 Technical Papers on Compressors—Centrifugal and axial flow compressors, their applications and methods of drive are discussed by company engineers in Form CH 10-60. In four sections, the 32-pp booklet covers high pressure centrifugal compressor applications, commercial applications of centrifugal compressors and the complementary axial, centrifugal compressors for pipeline duty, and the gas turbine applied to high pressure centrifugal pipeline booster. Articles are illustrated by engineering drawings, tabular material and charts as well as installation photos. Clark Bros. Co., Inc.

141 Self-Priming Pumps—Bulletin 816 explains design and operation of a line of corrosion-resisting self-priming pumps and lists their outstanding features. Sectional illustrations accompany text. Data on priming time, evacuating capacity included. The Duriron Co., Inc.

AIR CONDITIONING, FILTERING, DUST CONTROL

142 Improved Air Conditioning—Advantages and applications of a controlled humidity method of air conditioning are

(Continued on page 61)

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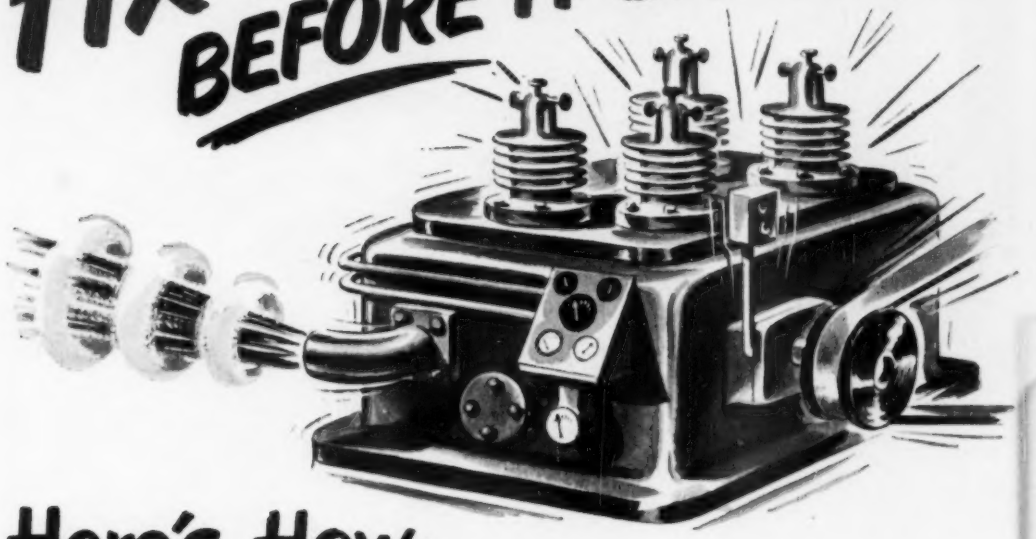

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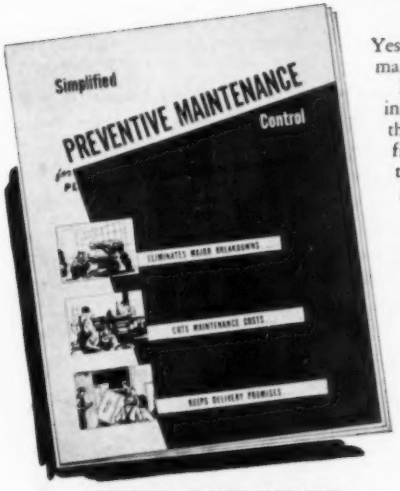

Yes, with a Kardex Visible system, you review and *control* your preventive maintenance schedules . . . *at a glance!* Here's how the system works—

Experience and performance are combined to set up a pre-arranged, tested, inspection schedule. Kardex colored signals indicate . . . *automatically* . . . those items due for inspection. A "Floating Inspector's" record is withdrawn from the Kardex pocket, filled-out with instructions specific to the check-up to be performed, and routed to your maintenance men as a work order and report sheet.

When the maintenance job is complete, the maintenance man checks off what he did and the card is returned to its place, *automatically* signaling job completion. Then, the Kardex signals are advanced to the next date specified. Details are posted on the maintenance card from the job card, providing a continuing, *permanent* record of maintenance activity.

The quick result: needless, costly "down-time" is eliminated; operating efficiency goes up; manufacturing costs go down—all accomplished with *less* clerical help and a minimum of time-wasting paperwork, thanks to the "floating" maintenance order!

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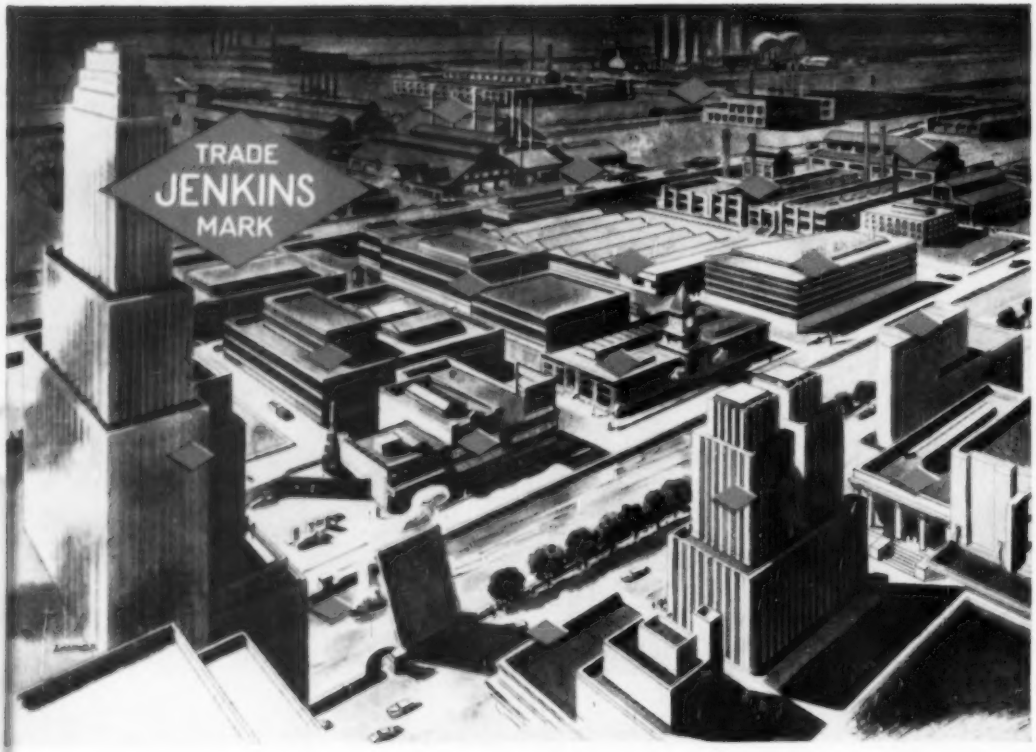

Acres of Diamonds

YOU SEE only the structures of commerce, soaring skyward . . . the strange new shapes of industry stretching beyond. Yet all around you are acres of diamonds. Diamonds that identify the thousands of Jenkins Valves on duty in the many different types of buildings essential to modern civilization.

Nothing holds its value like the diamond, in valves as in gems. Four generations of American builders have placed their trust in the Jenkins diamond and signature trade mark. Today, as in 1864, Jenkins Valves are the choice of men who plan shrewdly, always with an eye to future maintenance and operating costs.

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SINCE 1864
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(Continued from page 16)

Resin Coatings for Masonry, Pipe and Metal Tubing

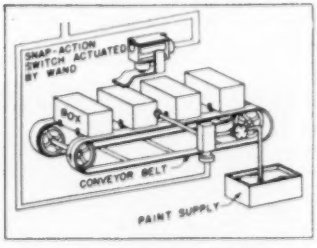
A NEW paint system for brick, stucco, concrete, concrete block and brick as well as cinder block has been developed from Vinylite resins to provide the following desirable properties: a tough, non-porous film that is exceptionally resistant to weathering all climates, resistant to industrial fumes, acids, alkalies, salt spray, oils and greases and cleaning solutions.

This system is being used on homes, apartment and office buildings, service stations, stores and industrial buildings such as factories, smelting plants, breweries and refineries where corrosive fumes are a particularly rugged test of coatings.

The resins used in the formulation of coatings being applied to nickel, galvanized black iron, cast iron, brass and cement lined pipe have contributed outstanding resistance to corrosive atmosphere, chemicals and abrasion. In several cases the life of oil well pipe has been tripled with the use of these coatings. In some cases, the output of the well was increased 20 per cent as there were no accumulations in the pipe.

Light wall steel tubing to be used in the manufacture of inexpensive outdoor structures is protected from corrosion by the application of coatings based on resins, and yet the coated tubing can be fabricated by bending, expanding, flanging, fluting and flattening without damage to the finish. No corrosion was encountered in these coatings after 1000 hours exposure in accelerated salt spray tests. *From the Bakelite Review, Oct. 1949, a publication of Bakelite Corporation, New York 17, N. Y.*

Switch Control on Conveyor Paint Operation



On a conveyor section of a carton making machine a snap-action switch located in front of the spray nozzle was used so as to be actuated by the carton on the conveyor. Then when for any reason there was no carton at the spray coating station, the normally-open switch either actuated the solenoid valve or shut off the spray pump motor. (From an article by Morris Klein in Micro Tips, Vol. 1, No. 5, a publication of Micro Switch, Freeport, Illinois.)

Ramset Fastening System

Cost comparison sheet for General Contractors Inc

	Estimated Present Method	Actual Ramset System
NO. OF FASTENINGS	7186	
TIME REQUIRED	2371.4 HOURS	484.3 HOURS
COST AT $ 2.00 PER HOUR	$ 4,742.80	$ 968.60
COST OF MATERIALS	718.60	1,651.68
TOTAL COST	$ 5,461.40	$ 2,620.28
COST SAVED WITH RAMSET SYSTEM		$ 2,841.12
		52 %
SAVED PER FASTENING WITH RAMSET SYSTEM		$ .39
TIME SAVED WITH RAMSET SYSTEM		1887.1 HOURS
		79.5 %

$2,841.00 SAVED WITH Ramset FASTENING SYSTEM

FOUR MINUTES per fastening (total time on job) with RAMSET SYSTEM instead of NINETEEN MINUTES with his old method saved this contractor $2,841.00 on one steel fastening job. Instead of slow, laborious, costly drilling—just load the self-powered, light, RAMSET FASTENING TOOL. Then—READY! RAM! SET! Quick, easy, economical—and tight. *Actual fastening time, less than one minute per fastener!*

Compare *your* fastening costs into steel, concrete and other hard materials. See how much time and money you can save with the simple, lightning-fast RAMSET SYSTEM. With 65 sizes and types of drive pins and threaded studs, you can do almost any kind of construction fastening job.

Your local RAMSET Specialist will help you cut costs and save time on your fastening work, whether done by your own men or by outside contractors. Write or wire us collect for name of nearest representative.

Ramset System
SAVES TIME . . . CUTS COST ON JOBS LIKE THESE:

Fastening—

- **Framework, brackets or supports to steel or concrete.**
- **Electrical equipment and services.**
- **Metal or composition roofs or walls.**
- **False and acoustical ceilings.**
- **Wire mesh for gunite.**
- **Heating, piping and air conditioning.**

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Steel to concrete · Wood to concrete · Wood to steel · Steel to steel · Steel to brick · Fabricated hard materials to steel · Concrete penetration · Steel penetration

Speed Maintenance...
Conserve Labor... with a

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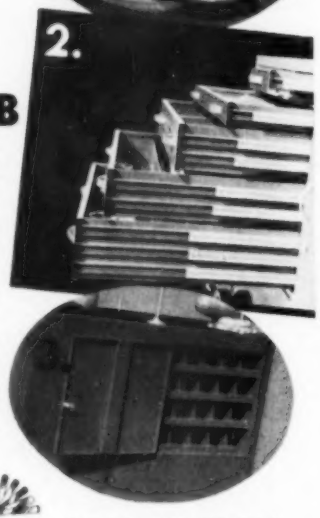
INDUSTRIAL CAB

No more running back and forth from job to tool crib when you have this Snap-on Industrial Cab! It carries all the necessary tools right to the job! Saves time! Saves labor! It's big . . . 45" long . . . 24" wide and stands 36" from floor! Three important features are (1.) Automatic foot brake that holds cab in rigid position. (2.) Seven drawers with "No-spill" slide runs plus two extra large tool storage bins. (3.) Twenty compartments in rear for supplies of nuts, bolts, washers, etc. It's a real time and money saver. Write for complete details.



SNAP-ON TOOLS CORPORATION
8068-B 28th Avenue
Kenosha, Wisconsin

Indirect Air Heating System

THE USE of indirect heating avoids contamination by products of combustion and reduces possible fire hazards when a process involves the exposure of material to air at high temperatures for drying or other conditioning.

This problem faced a company in the East which manufactures a variety of plastic film for use in the fabrication of raincoats, shower curtains, and protective coverings.

One step in the manufacturing of the film involves drying and solvent recovery. Relatively high temperatures are involved and as the solvent is flammable, care must be taken to avoid possible explosions.

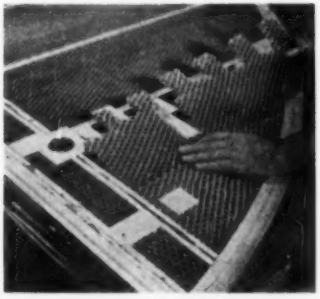
In this system, the heated vapor is circulated to the heating elements of an air heater from which it passes to the drier. After circulating through the drier, the solvent-laden air passes through a condenser where the solvent is recovered.

Two Dowtherm vaporizers, with a capacity of 2,200,000 Btu each, supply the heat for the system. Only one of the vaporizers is used at a time, the other acting as a spare. A condensate receiver and circulating pump furnishes a positive form of circulation to return the condensed Dowtherm to the vaporizer. This condensate return system is arranged so that it is able to serve either vaporizer.

With this heating system it is possible to maintain close temperature control and high temperatures can be attained with low pressures. *From Heat Engineering, a publication of Foster Wheeler Corporation, New York 6, N. Y.*

Honeycomb Laminates for Strength and Durability

HONEYCOMB engineered laminates are a combination of a honeycomb core, Bakelite resin impregnants and adhesives, and two relatively thin, dense, high strength faces or skins. The core material itself is a cellular structure resembling a bee's honeycomb, with the hexagonal shaped cells formed by walls of thin sheeting material. This material may be of phenolic resin impregnated paper, cotton, or glass fiber, as well as corrugated aluminum foil strips assembled with a specially for-



Honeycomb core of paper impregnated with phenolic resins is being assembled with frame and inserts. This material has extremely low maintenance costs

An abundance of diffused daylight streams into the plant of the American Can Company at Hillside, N. J., filtered through large windows and skylights of Blue Ridge Frosted *Aklo* Glass. Restful daylighting for the eyes—and a more comfortable place to work.

More comfortable to see . . . more comfortable to work

FILTERED DAYLIGHT

The kind of daylight you get in your plant depends on the kind of glass in your windows. You can provide abundant daylight, without annoying glare or excessive solar heat, with Blue Ridge Frosted *Aklo** Glass.

Reduces Glare—No need to paint glass or hang shades. Let the sunlight come in—softened and diffused by blue-green Frosted *Aklo* Glass. More eye comfort—better seeing—better workmanship and happier employes.

Retards Sun Heat—*Aklo* Glass excludes solar heat. Interiors are cooler—workers more comfortable. Load on air conditioning is effectively reduced. Temperature and humidity can be more accurately controlled.

Aklo is made by the Blue Ridge Glass Corporation of Kingsport, Tennessee, and sold by Libbey-Owens-Ford glass distributors. To see for yourself how Frosted *Aklo* Glass reduces glare and sun heat, ask your distributor for a Radiometer demonstration.

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Free Book on Reduction of Sun Glare and Heat

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Heat Absorbing • Glare Reducing • Figured and Wire Glass

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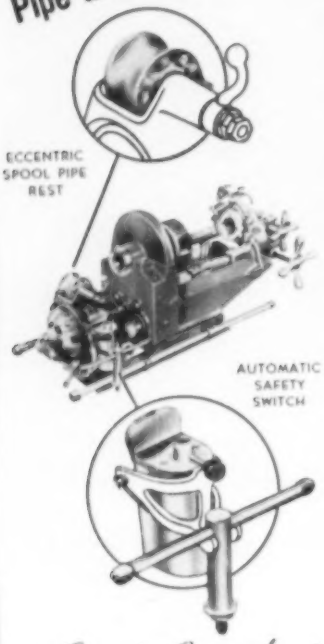
BEAVER Model-A

Pipe and Bolt Machine



Safer! Smoother!

Two new improvements—patents pending—have been added to further increase the safety, convenience and performance of the Beaver Model-A ½ to 2" Pipe & Bolt Machine—popular the world over for the past 13 years.

1. The new Automatic Switch Lock and Chuck Wrench holder makes it impossible to start the machine without removing the chuck wrench. This protects both workmen from injury and machine from damage. A highly important Safety Feature.
2. The new Eccentric Spool Pipe Centering Device is detached from the rotating spindle—prevents the whip of long revolving lengths of pipe from rocking the spindle and causing flat-sided, leaky threads.

And don't forget—there are 192 different kinds and sizes of dies available, in stock, for your every requirement when you buy a Beaver Model-A. This die inventory represents an investment of more than $150,000—to insure immediate user service. Sold by leading jobbers—

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BEAVER PIPE TOOLS

mulated adhesive into a honeycomb block.

In addition to lightness in weight, honeycomb laminates offer such other attributes as high compressive and bending strengths, good thermal insulating properties, a very low water vapor transmission rate, fire resistance, structural durability, resistance to decay fungi, and, among these advantages, extremely low maintenance cost.

This strength-weight characteristic of honeycomb laminates proved especially useful in a new lightweight knockdown box, designed to drastically reduce shipping and distribution cost.

Honeycomb has been used in aircraft floor panels, partitions and other secondary structures where the excellent strength-weight and stiffness-weight ratios of the honeycomb structure present substantial weight savings. *From an article by O. S. Tuttle, Chief Engineer, United States Plywood Corporation, in Bakelite Review, Oct. 1949, a publication of the Bakelite Corporation, New York 17, N. Y.*

How to Protect Idle Boilers from Corrosion

Two GENERAL procedures, dry storage and wet storage, can be employed in laying up idle boilers to protect the metal surfaces from corrosion.

Dry Storage—Dry storage of a boiler is recommended when the unit is to be out of service for a period longer than one month. The boiler to be stored by the dry method should be thoroughly dried internally by means of hot air stoves or a light wood fire. Water-tight trays of a moisture absorbing material, such as quick lime, should be placed in the boiler immediately after the drying-out process. Quick lime requirements will be approximately 30 lb for each 100 boiler hp.

When the quick lime has been placed in position, the manheads, handholes and all connections on the boiler should be tightly blanked or closed to exclude air as much as possible. After a period of three or four months the boiler should be opened and examined. The supply of quick lime should be replenished if it has deteriorated.

Recently adsorbents have become available in convenient containers suitable for use in the dry storage of boilers. Silica Gel (silicon dioxide) and Alumina (aluminum oxide) are examples of materials containing a vast number of sub-microscopic pores and great internal surface area to which water adheres or is adsorbed. Both of these materials have high adsorptive capacity per unit of weight, are nontoxic and may be repeatedly re-activated after becoming saturated with moisture without loss of adsorptive ability.

Wet Storage—Wet storage is desirable when boilers are to be left idle for a period longer than a week and when plant operating conditions demand emergency service, if required. This method is not applicable where freezing temperatures may be expected during the period of standby.

The boiler to be stored should be taken off line properly, thoroughly cleaned, inspected for tight connections and filled to the normal operating level. This should be followed by a short and light steaming period during which the unit is vented to the atmosphere to expel the dissolved gases released from the water by boiling.

The most common materials employed for wet storage are sodium sulfite and caustic soda. Sodium sulfite acts as an oxygen scavenger, minimizing corrosion during the storage while caustic soda will maintain the desired alkalinity.

Following the short, light steaming period the water should be made alkaline in excess of 400 ppm by the addition of caustic soda. The quantity required will approximate 3 lb for each gal of water in the boiler. Sufficient sodium sulfite should be added to produce a minimum residual sulfite content of 100 ppm. This feel will approximate 1.5 lb for each 1000 gal of water.

The solution may be added directly to the boiler through the regular chemical feedline if available. Otherwise, the materials can be introduced by "shot" feeding to the boiler during filling or by adding through a manhole before closing the boiler.

After the boiler has cooled somewhat, but before a vacuum is created, the unit should be filled to the top and through the superheater. All the connections should be tightly closed. Since corrosion is promoted by lukewarm water, the water in the boiler should be kept as cold as possible. For this reason, feed valves and all steam connections should be tight at all times. At weekly intervals, tests of the water should be made and the alkalinity and sulfite concentrations increased if necessary to maintain concentrations.

Use of Chromates—In some instances chromates have found application as protective agents for idle boilers. Chromates inhibit corrosion through the formation of a thin continuous passivating film on the metal surfaces.

After the boiler has been thoroughly cleaned and inspected it should be filled to normal operating level. Sufficient chromate should be added to establish concentrations as CrO4 between 500 and 1000 ppm. After the protective solution has been added, the boiler should be filled to the top and throughout the superheater.

While sodium chromate may be used for wet storage, it is generally more economical to employ technical granular sodium dichromate which is more readily available. Since a solution of sodium dichromate is acidic, however, it is necessary to adjust the pH by the feed of caustic. The addition of caustic soda to sodium dichromate forms sodium chromate in accordance with the following equation: $Na_2 Cr_2 O_7 . 2H_2 O + 2NaOH = 2Na_2 CrO_4 + 3H_2 O$.

For each 100 lb of technical sodium dichromate approximately 27 lb of caustic soda will be required to give a pH value between 7.5 and 9.5. The choice between the use of sodium chromate and sodium dichromate for boiler storage purposes, however, is one of economics and convenience. It is important to realize that chromate is a toxic chemical. When steam is used in food processing it may be better not to employ this method.

It is reported that boilers laid up with chromate have been put back on line in emergencies without first removing the solution. *From The Betz Indicator, a publication of W. H. & L. D. Betz, Philadelphia 24, Pa.*

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says this foreman

"no overhauls or oil changes necessary on this press during that period"

"During eight years of operation we've never found it necessary to overhaul this straightening press for any reason," says the Foreman of a Midwestern manufacturing plant. "Periodic checks have revealed little or no leakage through oil seals, a complete absence of oil sludge in valves, lines, and sump, and a minimum of wear in all moving parts.

"We know this record wouldn't have been possible without a hydraulic fluid of the caliber of Gulf Harmony Oil. The fact that we have never found it necessary to replace the original charge is ample evidence that it doesn't form sludge, and the absence of mechanical trouble during the entire eight years indicates that this oil has excellent lubricating qualities."

A typical case of the satisfaction expressed by users of Gulf Harmony Oil, which is establishing performance records in the hydraulic systems of hundreds of presses, machine tools, and other types of metalworking equipment. High resistance to oxidation, an effective corrosion inhibitor, and Gulf's patented anti-foam agent are a few of the reasons for its fine performance.

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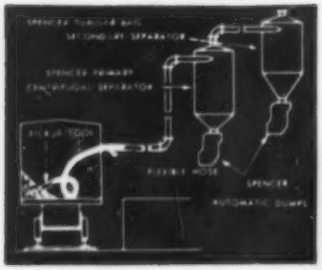
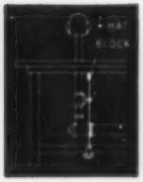
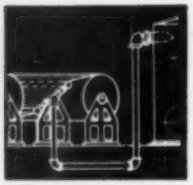


Lint is removed from finished hats and liner cloth, hats are cleaned, and freight cars are loaded, unloaded, and cleaned.





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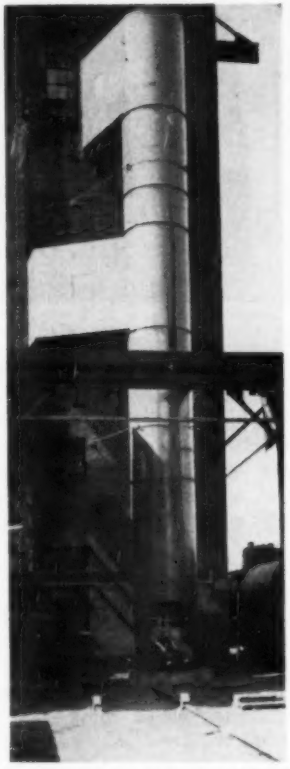
Flame-Proofing Welding Clothes

HERE IS a useful bit of information for those who find leather clothing too hot and cumbersome in summer and resort to coveralls, etc., only to find that they burn like the dickens under a little encouragement from hot flux and flying sparks.

This flame-proofing formula is as follows: 9 oz crystalline borax dissolved in 2 qt of water. 4 oz boric (boracic) acid dissolved in 2 qt of water. Combine the two quantities to form one gallon of solution. Soak material from 10 to 15 minutes and then dry. This must be renewed after every washing. The material chars through where the hot metal touches, but does not smolder or burn . . . good for curtains and such items exposed to flames accidentally. *From an article by F. Gale Marshall in The Stabilizer, Vol 18, No. 4, a publication of The Lincoln Electric Company, Cleveland 1, Ohio.*

Here's Safe Slide for Escaping Fires



Wirco Life, published by American Steel & Wire Co.

Worker is shown coming out of exit end of newly erected fire escape. Designed for emergency exit from three-story agitator building, fire escape has outlets on second and third floors

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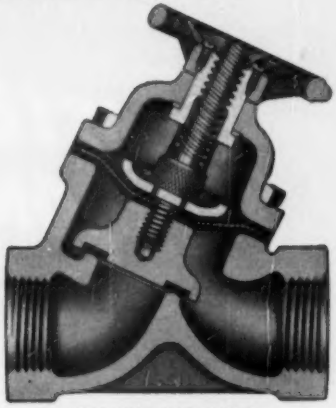

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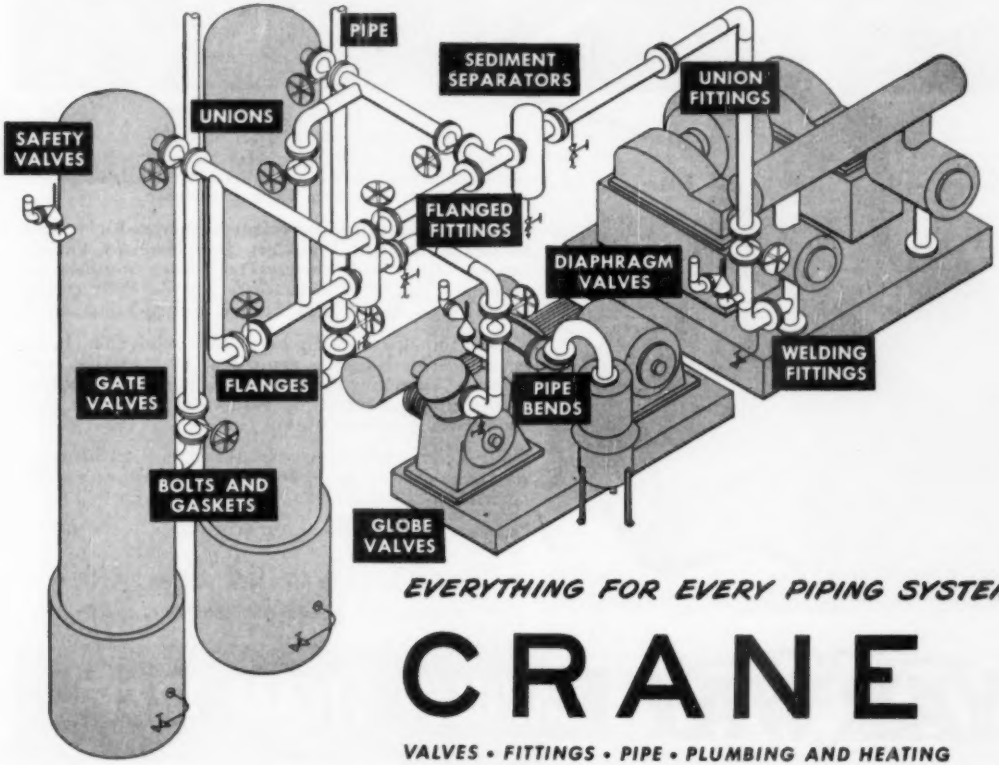

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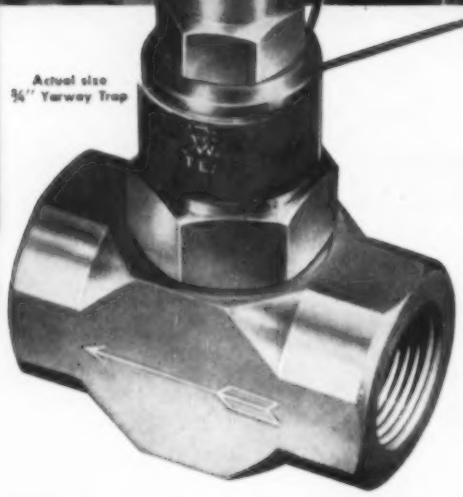

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¾" Yarway Trap

For space heating and for process work, the story is the same—Yarway Impulse Steam Traps get equipment *hotter, sooner and keep it hot!* You hear it at little plants and big plants, wherever Yarways are used.

The installation shown above is at the Ingram-Richardson Manufacturing Co., Frankfort, Ind. Here 23 Yarway Impulse Traps with Yarway Fine Screen Strainers are doing a completely satisfactory job on Unit Heater installations, finned pipe heaters and pickling tanks.

Yarway Impulse Traps discharge *continuously* under heavy loads, *quickly* bringing equipment to operating temperature. Then they keep equipment at *peak efficiency* by discharging condensate at *short intervals,* rather than waiting for quantities of it to collect.

Other Yarway advantages—small size, easy maintenance (only one moving part), good for all pressures without adjustment, low cost.

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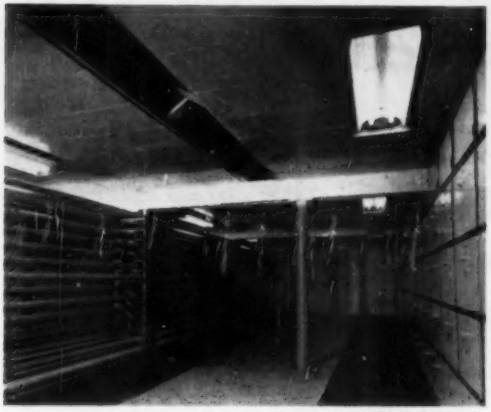
PLANNED LIGHTING Fits the Job

No matter what the problem: corrosive fumes, explosive fumes or dusts, modern architecture, older buildings, special or high lighting intensities, there are fixtures, lamps, ballasts, and paints to take care of the job and give an "engineered" lighting job. Shown are a few

Fig. 1. Good fixtures will operate under practically any or all conditions. This locker house maintains a constant 0 to minus 5 F temperature with the fixtures installed less than 3 in. above the refrigerated coils. The entire area is 30 ft by 50 ft with 9 fixtures providing 9/10 watts for every one of the 1,080 sq ft not occupied by refrigerator coils. Illumination intensity beneath the fixtures is 15 ft candles at a distance of 24 in. above the floor, 8 ft candles between the fixtures at the same distance from the floor. The lamps had burned for 800 hr when the readings were taken



Photographs: The Edwin F. Guth Co.

Fig. 2. Engineering and drafting offices of The Austin Company reflect the modern trend in industrial design. Recessed troffers with cross baffle shielding are mounted at heights ranging from 13 ft near the outside of the 70 ft span to a height of 22 ft at the peak. An unusual feature of this installation is the use of lower brightness lamp bulbs. Instead of using 3500 deg white lamps the installation employs one daylight and one soft-white lamp in each fixture. In order to insure comfortable seeing conditions and obtain the maximum reflectivity of light the lower wall areas have been painted in graduated shades of soft gray-blue

Fig. 3. One of the largest printing plants in the world recently modernized its lighting system. The photograph shows a portion of the bindery where modern fixtures with egg crate diffusers combine with a repaint job to give excellent visibility and cheerfulness. The plant believes that employees will now be able to produce a better day's work at far less fatigue and eyestrain than formerly was the case

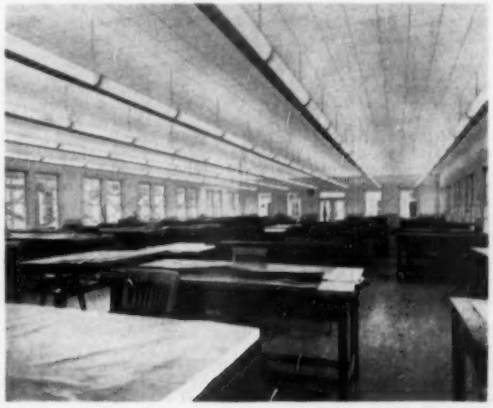


Fig. 4. Another drafting office, this one at United States Engineers in New Orleans. This system of luminous-indirect fixtures produce 102 to 104 foot candles of smooth, uniform illumination. The light is so well distributed that there are no shadows on work areas and only very small shadows on the floor directly beneath the tables. The fixtures are mounted in continuous rows, 9 ft high and rows are spaced on 6 ft 8 in. centers with resultant good light distribution

Fig. 1. A 25 ton, 2 axle, 150 hp diesel-electric switcher in a typical industrial service. Note the good visibility from sides and front of the cab, and the two-axle truck

Fig. 2. A 65 ton, 470 hp unit with two, two-axle swivel trucks. As to comparative costs, a unit of this kind costs approximately $54,000; those shown by Fig. 1 about $18,000

How to Cut Industrial Costs with Diesel-Electric Switchers

Requirements for industrial plant switching . . . Comparison of diesel-electric and steam . . . Tractive effort, torque and effective utilization of power . . . Economy of operation as affected by efficiency, standby and labor . . . Increased safety . . . Types, sizes and investment costs . . . Breakdown of operating costs . . . Case studies with cost data

By A. B. McMILLON, Industrial Haulage Div., General Electric Co.

WIDE ADOPTION of the diesel-electric locomotive for industrial haulage aided materially in the record-breaking National Defense production performance. Approximately 1500 industrial type diesel-electric locomotives were harnessed to this task between 1939 and late 1944. They were used in steel mills, chemical plants, cement plants, ordnance plants, ordnance depots, Navy yards and operating bases, shipyards and many other industries.

Almost universal use of diesel-electric switchers in war production was precipitated by the demand for maximum performance. Industry's demand today is for economical operation. Diesel-electrics fulfill both of these requisites. Wartime experience demonstrated that diesel-electrics are the most economical form of motive power available in addition to being top performers.

Why does this form of motive power give better performance? Why is it more economical to operate? Are these statements provable by actual record?

PERFORMANCE: Industrial haulage in general requires low speed and hard pulling for short distances with intermittent service and long waits between switches. On an average, stand-by time amounts to approximately 70 per cent of the total shift. The diesel-electric is well suited to meet these requirements. In effect, the electrical transmission furnishes an infinite number of gear ratios.

This allows the engine to work at rated speed and horsepower under all conditions and over the entire switching speed range. When a switch is completed the diesel engine may be shut down and no fuel is consumed while standing by. At the same time full power is immediately available by pushing the start button and pulling the throttle handle.

In contrast, a steam locomotive develops its rated power only at well above switching speed. When a switch is completed, steam is kept up to make power available for the next job so that fuel consumption continues through the stand-by period. Plants operating steamers frequently run a low fire to avoid excessive fuel consumption during stand-by but this means that full power is not available until the fire builds up and a full head of steam is available.

Tractive effort delivered by any locomotive is determined by the weight on the drivers and the coefficient of friction between the drivers and the rail.

Weight on the drivers is sometimes limited by the light rail used in many industrial plants. Diesel-electrics are ideally suited to these conditions because they are designed with low weight per driving axle and all axles are powered. The smooth torque characteristics of the electric drive enable these locomotives to operate at maximum adhesive values of 30 per cent or better as compared with maximum adhesion of less than 25 per cent for steamers. The result is more tractive effort per pound of weight on the drivers.

Another operating advantage lies in the short rigid wheelbase, characteristic of industrial diesel-electric locomotives. In industrial plants, where short radius curves are prevalent, this feature reduces track maintenance costs and flange wear on the locomotive wheels.

There are other operating features which are important to an industrial user. Good visibility from the operator's cab makes for safe and efficient switching. Fire hazards and smoke nuisance accompanying steam locomotives are eliminated. Finger-tip control reduces operator fatigue and results in safer and more efficient switching operations.

OPERATING COSTS: Figures on operating costs based on experience with hundreds of diesel-electric industrial switchers show that this type of motive power will do an industrial rail haulage job at lower cost. For example, fuel consumption figures indicate that a 45-ton diesel-electric locomotive will operate for an hour on $0.24 worth of fuel as compared to $1.00 worth for a comparable size steam locomotive. This difference in fuel cost springs from the following main factors:

1. The diesel engine has a higher thermal efficiency of some 30 per cent as compared to 6 to 8 per cent for a steamer.

2. The diesel engine may be shut down when the locomotive is not working and fuel consumption stops, where-

Table I. Comparison of hourly operating costs for average conditions for 45 ton steam and diesel-electric switchers

STEAM	COST ITEM	DIESEL-ELEC.
$2.60	Crew wages	$1.40
1.00	Fuel	.24
.04	Lubricants	.06
.09	Supplies	.02
.12	Engine house	.03
1.00	Maintenance	.30
$4.85	Total	$2.05

Table II. Standard diesel-electric units are available in many sizes, ranging in cost from about $18,000 to $70,000

SIZE	TYPE AND POWER	APPROX. COST
25 ton	2 axle, 150 hp	$18,000
45 ton	Two, 2 axle swivel trucks, 300 hp	34,000
50 ton	2 axle (steel mill service), 300 hp	32,000
65 ton	Two, 2 axle swivel trucks, 470 hp	54,000
80 ton	Two, 2 axle swivel trucks, 470 hp	56,000
95 ton	Two, 2 axle swivel trucks, 600 hp	71,000

as, a steamer may keep fire in the fire box 24 hr per day.

3. A diesel-electric requires approximately half the rated horsepower of a steam switcher to do the same type of switching job. This is because the diesel-electric utilizes its full rated horsepower through almost the entire switching speed range, whereas, a steamer utilizes only a fraction of its capacity at switching speed.

Fuel economy is a substantial and important item when an industrial plant converts from steam to diesel-electric motive power but other economies are also realized. Considering that there is no job for a fireman on a diesel-electric locomotive it is sometimes possible to operate in industrial plants without a fireman. Thus crew wages are cut to roughly 60 per cent of those for a steam locomotive. Diesel-electrics eliminate coal, water, ash handling expense and facilities.

Because the wearing parts of a diesel-electric are small, inexpensive and accessible as compared to the boilers, fire boxes and the heavy reciprocating parts of a steamer and, because major maintenance on diesel-electric is less frequent, locomotive maintenance is approximately one third that of a comparable steamer.

Economies inherent in diesel-electric switchers result in an operating cost comparison as shown by Table I. These figures will not apply for every case because the character of the service and other operating factors vary, but in general the comparison is valid.

In a plant with extensive haulage operations the factor of availability enters the operating expense picture. Availability determines the number of locomotives required and consequently the number that it is necessary to service, maintain and depreciate. On an average, the diesel-electric locomotive is available 90 to 95 per cent as compared to 60 or 70 per cent for steam. The Spreckels Sugar Co. purchased a 65-ton diesel-electric locomotive in 1946. During the first 6096 hr of operation it was out of service only 93 hr. Most of this time out was accounted for by routine lubrication and maintenance. Operation was 21 hr per day.

A hypothetical application using the hourly rate from Table I illustrates what the hourly cost comparison means to an industrial plant on an annual basis.

Assuming a 12 hr per day operation 5 days per week, an annual amount of 3120 hr per locomotive, the annual operating expense of the steamer will be 3120 times $4.85 or $15,132. This is compared to 3120 times $2.05 or $6,396 for a diesel-eletcric. The difference is $8,736 representing an approximate return of 25.7 per cent on the $34,000 investment.

A plant with an operation like this could expect to pay for a new diesel-electric locomotive in 4 yr with the savings realized in operating expenses alone. A plant switching 16 hr per day or more could improve on this figure for savings in direct proportion to the hours operated. These economies are further enhanced by the fact that in most cases the switching job will be done in less time.

Based on experience gained in the application and use of diesel-electric switchers in industrial plants, the sizes listed by Table II are now produced in quantity and offered to industrial users on relatively short shipment. This standardization has resulted in a considerable reduction in price.

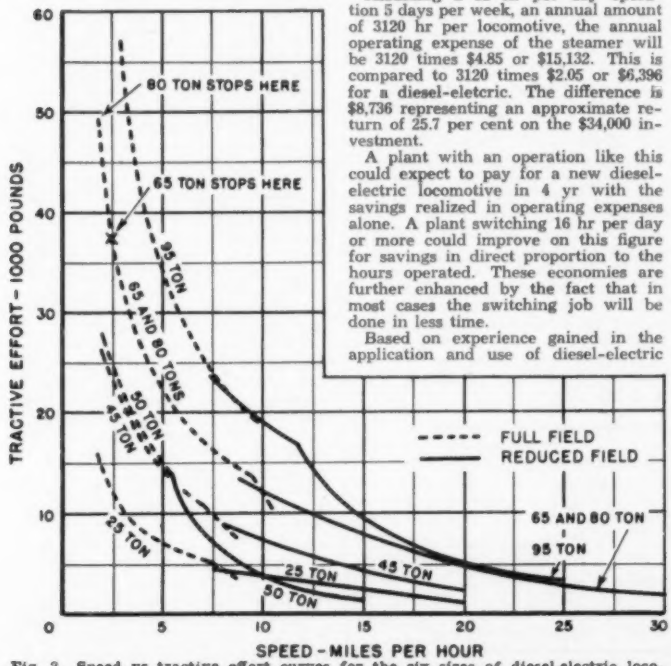


Fig. 3. Speed vs tractive effort curves for the six sizes of diesel-electric locomotives listed in Table II

CASE STUDY SUMMARY—Experiences of plants using standard diesel-electric switchers serve to illustrate what a plant might expect by using this type of motive power.

EDITORS NOTE—Case studies of operating costs cover such representative industrial concerns as The W. T. Smith Lumber Co., Marion Power Shovel Co., Copperweld Steel Co., Aluminum Ore Co., and American Cyanamid Co. Because this detailed data, aside from general interest which is served by figures of Table I, is a matter of immediate concern to a relatively few plant engineers, this portion of the article has not been printed but is available upon request.

The detailed summary shows such data as . . a 25 ton diesel-electric replaced a 45 ton steamer and cut costs from $4.54 to $1.16 per hr . . Availability of 96 per cent . . Annual savings of $11,000 and cost reductions from $57 to $25 per shift . . 24 hr per day, 7 day per week operation except for bi-monthly inspection and maintenance periods with cost cuts from $14 to $7 per day . . Fuel and lubrication costs after 19,000 hr operation . . Two units saving $3,400 and four derailments monthly.

Another factor that has not been mentioned is the reduction of demurrage charges and better intra-plant scheduling which a plant switcher permits. Again, have you found out what the railroads have charged you for switching over the past 2 or 3 yr? Possibly a 25 ton switcher is not such a luxury as might seem on the surface!

Industrial plants which have operated both types of motive power find that diesel-electric switchers in every way out-perform the steam locomotives which they replaced. Furthermore, considerable economic advantages result from the changeover. An industrial plant presently using steam locomotives will find it hard to justify continued use of this form of motive power considering that industrial diesel-electric locomotives, which will save enough in operating expenses to cover their purchase in approximately 4 or 5 yr, are available.

DETAILED COST DATA AVAILABLE

While space did not permit publication of complete case study cost data referred to in the article, it is available in mimeographed form. If you want this additional information, which will prove extremely useful to those who now use switchers as well as to many who have heretofore considered a plant switcher impractical, write the Editor or just note "Locomotive" on the post-card!

Application and Care of V-BELTS

How a V-belt works . . . Importance of proper contact and tension . . . Five points to consider in properly engineering a V-belt drive . . . Maintenance a must for maximum life . . . Causes of breaks and wear and methods of prevention . . . How to make a V-belt survey

By R. B. RANDOLPH and J. C. PARFITT, V-Belt Specialists, The B. F. Goodrich Co.

V-BELT DRIVES, manufactured according to established standards, are designed for long life and high efficiency. They have become a highly popular type of mechanical power transmission and are an important factor in every industry. They require a minimum of attention and maintenance and are easily applied. Stocking is no problem and cost is such that they fall well within the appropriations of cost-conscious industries.

Application of V-belt drives can be considered for most mechanical power transmission drives found in plants today; wire V-belts for increased horsepower, shock absorbing V-belts for shock loads, low stretch V-belts for fixed centers, wide V-belts for variable speeds, and V-belts which combine high horsepower, good shock absorbing ability, as well as oil proof, oil resistant, static resistant qualities are readily available.

Here's the single most important fact for those engaged in V-belt maintenance to understand—how a V-belt drive works. For this drive, which works in an entirely different principle, needs different care. Whereas a flat belt depends on tight frictional contact for its grip, a chain drive on sprockets, a gear drive on teeth . . . a V-belt produces its own grip in different ways.

While traveling in a relatively straight line between sheaves, the section of a V-belt is trapezoidal. When it rides in the groove of a sheave and bends as it begins to circle the sheave, this bending brings out the V-belt's bulging tendency.

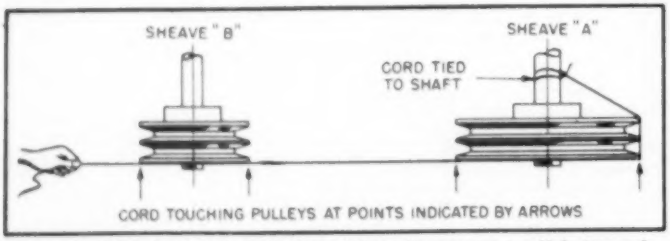
That is why one of the most important jobs of maintenance is to keep the side walls of sheave grooves perfectly straight. Where conditions are permitted which wear the walls out of straight, the gripping power and efficiency of V-belts will be greatly reduced.

While a V-belt does not depend on tension to provide its grip, it is dependent on tension for the extent of its grip. Inadequate tension allows a V-belt to hang down away from the bottom of a sheave—reducing the arc of contact. A properly taut V-belt, on the other hand, is wrapped around the sheave in a full arc.

The importance of contact is illustrated by the fact that horsepower ratings for the different sizes of V-belts are based on a 180 deg arc of contact. Actually of course, this arc varies from one drive to the next and allowance is made for the variation when the drive is engineered.

So, when a properly engineered drive is delivered, it is assumed that proper tension and proper contact arc will be maintained. Otherwise slip is apt to develop. As the average plant has no equipment for measuring tension in terms of pounds-pull, it generally is measured by rule of thumb. Some of these rules are more superstition than science. Some are good. Perhaps the best one is this: "A slack V-belt feels dead when you thump it with your hand; a properly taut V-belt is springy."

On drives lacking proper tension, a whipping action can occur and snap V-belts. This is most apt to happen at peak loads or when starting the motor. Any extra slack is suddenly taken up at these times and the last section of the V-belt to be whipped taut is jerked with a force far greater than it was designed to withstand. This explains why a loose V-belt will stretch more in service than a tight one. Vicious jerks produce more stretching than a steady pull.



When a straight edge is not available a string will serve as a satisfactory substitute when used as shown above. Make sure cord touches at all points indicated

Don't be afraid to pull V-belts tight. Stretching them slightly in adjusting tension is good for V-belts. And remember, if operating schedules work the machines more than usual, V-belts have to be adjusted oftener to maintain proper tension. Check oftener for stretch and sag especially during the breaking-in period.

Five points must be considered in properly engineering a V-belt drive. They are:

1. *Diameters:* Every V-belt has an "easy arc" depending on its cross sectional thickness. If you bend it too sharply around a sheave which is too small in diameter, the internal friction of excess flexing will cook the life from the belt far too rapidly.

2. *Centers:* The shorter the centers in a drive, the fewer feet of belt that can stretch. Also, the lower the total potential stretch to threaten slippage and cause "crack-the-whip" action. Proper engineering aims at short centers.

3. *Number and Size:* The number of belts and the size of the belts must be engineered to meet the drive's capacity. If belts are correctly engineered, stretch is held to a minimum and each belt carries its share of the load assuring a smooth running, efficient drive. This is not the whole story since speed counts too.

4. *Speed:* Just as a truck's motor can pull a heavier load by turning faster to do it, so a set of V-belts can pull a heavier load by traveling faster. In a V-belt drive an increase in pulling capacity is accomplished by using larger sheaves, which have a higher rate of rim travel and thus produce greater belt speeds.

5. *Contact Arcs:* All horsepower ratings for V-belts are based on 180 deg arc of contact with sheaves. However, this factor varies from one drive to the next, depending on ratios and center distances, and must be carefully considered in engineering each drive.

From considering these five points it can be seen that the power transmitting capacity of a properly engineered drive is an accurate measurement. Where it becomes necessary to change motors, reengineering of the drive may be necessary.

To secure maximum life from your V-belts proper maintenance is a must. The belts should run free of any obstructions which might snag or tear them. Sheaves should be in

alignment so check for sheave alignment.

When a suitable straight edge is not available, misalignment of sheaves can be detected readily with the aid of a cord by the method demonstrated in Fig. 1. Assuming that the shafts are parallel, as they should be, a light strong cord secured around one shaft and stretched tightly along the sides of both sheaves should touch at all points indicated by the arrows if the sheaves are in perfect alignment. Care should be taken to see that the cord is held straight and tight and that it just barely touches the sheave at the indicated points. By rotating each sheave through one-half revolution, alignment can be checked by noting whether or not the rim contact of either sheave with the cord is disturbed. A pulling away of either of the inner rim contacts will indicate misalignment which should be corrected promptly to obtain longer life.

Snub Break: Two signs usually show a "snub-break" V-belt to be the victim of "crack the whip" action. These are: 1. Cover wear indicates considerable slip; 2. A fairly clean break suggests a sudden snap.

Prevention: Keeping V-belts properly taut should be a routine procedure. Test for excessive slack. Or test for slip by comparing speed ratio of sheaves between no-load and full-load. Allowable variation: one-half of one per cent.

Scuffing: Bolts protruding inside the guard sometimes do damage here. Such scuffing can exert enough "braking" to cause a sudden snap.

Prevention: When placing guards or steelwork near drives, some stretch and sag should be anticipated. Leave enough clearance so V-belts can sag a bit without disastrous results.

Slip Burn: Usually belt is too loose to pull its load. While belt stands motionless, frictional contact with spinning driving sheave melts its rubber. When the belt finally does grab, it often snaps.

Prevention: See "Prevention" under Snub Break above. Of course, the load may be too great. If tension in the drive is proper and sheaves and V-belts are free from grease or oil yet slip persists, check machine for increase in load.

Ply Separation: A split along pitch line indicates V-belt is being run over a sheave too small for it. Excessive bending produces excessive internal friction, baking the life out of the rubber binder which holds the pulling cords together.

Prevention: With every V-belt goes a minimum sheave diameter. Any saving in sheave cost by ignoring manufacturer's recommendations is more than paid for in excessively frequent belt replacements.

Oil Deterioration: This often occurs in V-belts driving threading equipment which employs cutting oils.

Warm Feet for the Iron Horse

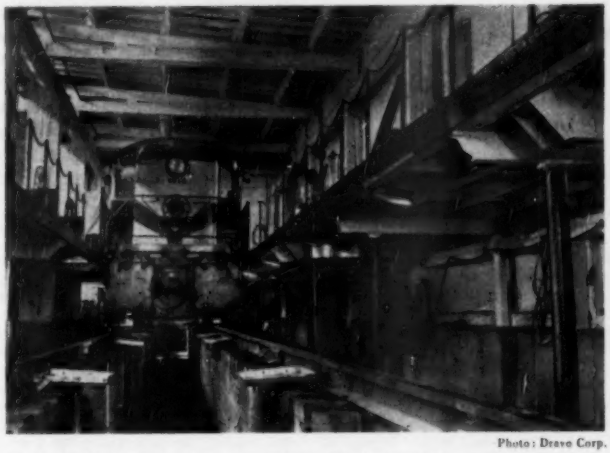


Photo: Drave Corp.

At the Detroit & Mackinac Railway's diesel locomotive repair and maintenance shops, Tawas City, Michigan, blasts of heated air are discharged on locomotive undercarriages to melt off snow and ice. The air, delivered to the repair pit through duct work from a large air heater, also helps to maintain comfortable temperatures for employees. A total of four oil-fired heaters are used for this purpose and for comfort heating of the repair shop

Prevention: Splash guards will provide some protection against oils and greases. But where considerable oil reaches V-belts, special oil-resisting V-belts of synthetic rubber may be the best answer.

Abrasion: Abrasive dust wears the sidewalls, narrowing belt width. Belt then rides on bottom of groove, slips, loses its proper shape as well as its size.

Prevention: When V-belt drives are located in dusty surroundings dust guards provide important protection. Because slip contributes to abrasive action, proper tension is doubly vital in dusty places.

Broken Cords: Inner cords often are broken when belt is pried over sheave flange on installation. (Cover, being bias-cut fabric, stretches without breaking). Such breaks can be caused also by pieces of metal or wood falling into the groove.

Prevention: Never pry new belts into grooves, nor ring them from one groove to another. Motor should be loosened and moved forward. Every drive should have a take-up for proper installation of new V-belts and for adjustment of tension.

A properly conducted V-belt survey is a valuable asset to plant engineering, purchasing and stores department in that it tells purchasing and stores minimum quantities of V-belts of a given size to stock and assures plant engineering that an adequate quantity of V-belts are in stock in the event of failure of any given drive.

A good way to make such a survey is to have a clerk and maintenance man go through the plant and inspect every V-belt drive on machines, fans, water coolers, office machines and other drives. List each machine by the machine number, department number, number and size of V-belts and sheaves used on each machine.

Next tabulate them in numerical order by department and machine number and list each machine on one line showing sheave sizes, number and sizes of V-belts on the same line. Note any changes necessary, such as shorter centers, belts wearing because of an oil condition and note worn sheaves for replacement.

Add another sheet to the survey and arrange the number and size of V-belts of each size in use without regard to machine or department number. This sheet will enable the stores department to determine the amount of stock to carry of each size—usually 20 per cent of the total number of a size is sufficient. However, it is necessary to have a sufficient number of belts of a given size to supply the largest drive in the event the 20 per cent figure falls below the number of belts of that drive. For instance, if there is a drive consisting of eight — B-68 V-belts and the total number of size B-68 shown in use throughout the plant is ten, there should be eight B-68 in stock.

A check against this list with the present inventory, will show over or under stocks. This system was found invaluable during recent years where plants expanded rapidly and more recently where many machines of a special nature were cut back into limited or non-use.

Plant Drinking Water Systems Need Careful Planning

Discussion of unit cooler and central cooler types, advantages of each . . . Where to use recirculating and non-circulating systems . . . Cooling requirements for employees in various types of industries . . . Sample problem worked out with chart . . . Insulation, draining, pipe sizing

By TYLER G. HICKS, Mechanical Engineer

PLANT ENGINEERS know that a good drinking water system quickly pays for itself by increased personnel efficiency and comfort. Since a first rate drinking water system is easy to plan and economical to install, plant engineers who do not have a system at present should consider the many advantages gained by its use.

There are two basic types of drinking water systems in use today: unit coolers and central coolers. For small groups of employees such as in office, shipping, and packing rooms of moderate size plants, unit coolers are generally more economical than the central type. Where large groups of employees are concentrated in several areas or floors, central coolers are often more economical than unit types. In any plant, the most economical system can readily be selected after a study of water and refrigeration requirements.

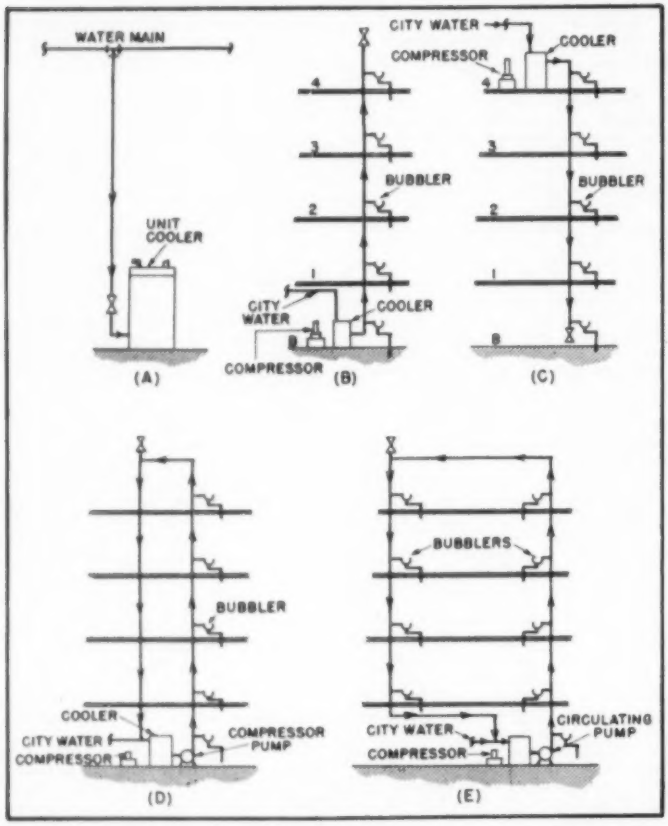


Fig. 1. Typical industrial drinking water systems: A. unit cooler; B. non-circulating upfeed; C. non-circulating downfeed; D. recirculating system with bubblers on one riser; E. recirculating system with bubblers on two risers

Figure 1 shows typical unit and central cooling systems. As can be seen, water for unit coolers can be taken from process or wash water mains in the area, provided that it is pure. In central cooling systems two piping arrangements are used, non-circulating and recirculating. Non-circulating systems, Fig. 1B and 1C, have low piping costs but are unsatisfactory when intermediate floors are unoccupied. For instance, with the second floor unoccupied, water which reaches bubblers on the upper floors will be warm when first used.

With recirculation, the water is continuously cooled by being pumped through a refrigerated cooling chamber. Power requirements for this arrangement are greater than for non-circulation because both the refrigerating compressor and circulating pump must be driven during system operation. City water pressure is usually sufficient to supply water to all bubblers in non-circulating systems.

Cooling Requirements

Table I lists the water requirements for each employee in various industries. Besides the actual water consumption by individuals there is also a loss of cooled water resulting from heat gains in the piping of central cooling systems. Correction factors which must be applied for these cases are also given in Table I. Figure 2 is an alignment chart which permits quick determination of the refrigeration tonnage needed for water cooling. Use of these data is as follows.

Problem: A factory doing "heavy work" employs a maximum of 800 people. City water enters the plant at 75 F. Find the total tonnage necessary for unit coolers and for a central cooling system with bubblers, when 400 ft of piping is used in the system.

Solution: For most industrial plants, the temperature of the drinking water at the bubblers should not be more than about 30 F below the surrounding air temperature. Hence, assuming that air temperature is 70 F, drinking water temperature = 70 — 30 = 40 F. The city water temperature must be reduced 75 — 40 = 35 F. Water consumption of 800

Table I. Drinking water requirements for various working conditions and varying room air temperatures

Working Conditions	Water Used and Wasted Per Person Per 8 hrs
Steel mills, Foundries	2.4 gal
Factory (heavy work)	1.6 gal
Factory (light work)	1.2 gal
Office Buildings	1.0 gal
Dept. Stores	4 gal/faucet/hr

Heat losses in insulated lines Gallons of water per hour

Pipe Length—(pipe assumed to be ½, ¾, or 1 in. diam.)	Difference between room air and drinking water temperature, Deg. F.		
	20	30	40
100 ft	1.1	1.6	2.1
200 ft	2.2	3.2	4.2
300 ft	3.3	4.7	6.3
400 ft	4.4	6.4	8.4
500 ft	5.5	8.0	10.5

people engaged in heavy work is $800 \times 1.6 = 1{,}280$ gal per 8 hour day, using data from Table I. Also, for a 30 F difference between water and room air, line heat losses = 6.4 gph, or $6.4 \times 8 = 51.2$ gals per 8 hr day.

Total water consumption is therefore, $1{,}280 + 51.2 = 1{,}331.2$ gal per day, or $\frac{1331.2}{8} = 166.5$, say 167 gph for the central cooling system. Connecting 167 gph on the gph scale of Fig. 2 with a 35 F temperature reduction, refrigeration required = 4.10 ton for the central cooling system. For the unit cooling system, water cooled = $\frac{1280}{8} = 160$ gph and total tonnage = 3.9, from Fig. 2. This tonnage would be divided among the various units used.

Minimum pipe sizes for unit coolers and bubblers are specified by the manufacturer. These sizes should never be reduced. Unit coolers and bubbler drains can be connected to existing plumbing drains if the latter are of sufficient size. If not, a separate drain must be run to the plant sewer.

Supply risers for non-circulating and recirculating systems should be liberally sized to prevent large friction losses. Insulation thickness should at least equal that shown in Table II. To find the head on the circulating pump, determine the sum of: 1. Vertical distance between pump and highest fixture, 2. Friction in horizontal and vertical risers, bends and elbows, 3. Pressure required at highest fixture, and 4. Pressure regulation above cut-in pressure, when automatically controlled. From this sum, subtract the minimum city water pressure.

Table II. Recommended insulation thicknesses for several different humidities and air temperature differences

Humidity Per Cent	Inches Thickness for Temperature Differences of:		
	50 F	60 F	70 F
Up to 70	1	1	1½
70 to 80	1½	2	2
80 to 85	2	2½	3

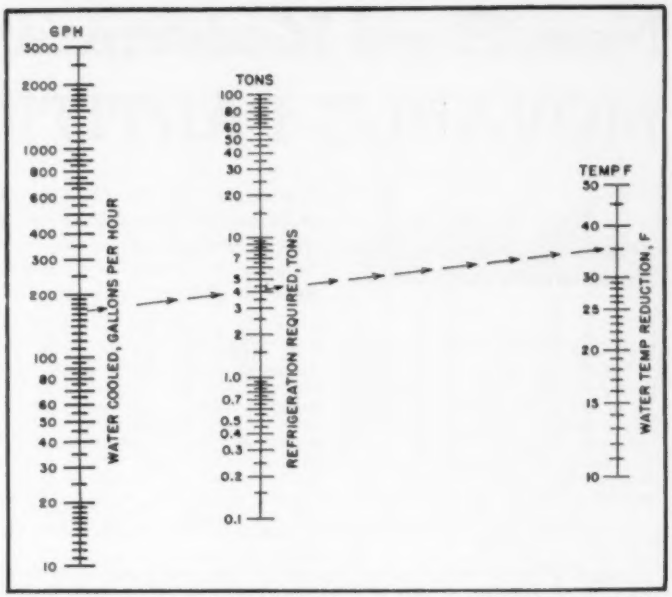


Fig. 2. Alignment chart for determining necessary refrigeration tonnage for cooling drinking water. Follow the arrows for solution to problems (see text)

Bubblers should be installed on every floor. A maximum of 300 ft between bubblers is considered good practice. Where large employee groups are encountered, the distance between bubblers should be less, in some cases only half this distance. Never locate bubblers close to production machines, vertical steam pipes, or fire protection equipment.

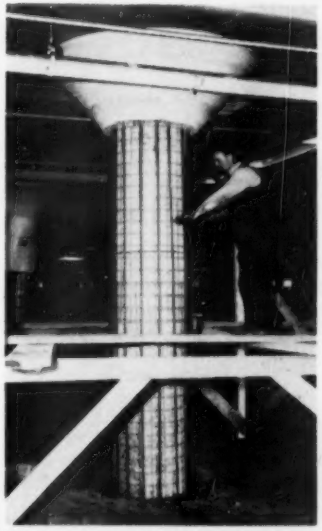
Reinforcing Building Columns Permits Expansion

Contributed by H. B. Clark
Project Arch., Westinghouse Electric

THE CONVERSION program at our Buffalo plant which we acquired from Curtiss-Wright required additional space at the west end of the main plant.

A building extension 150 ft by 600 ft was desgined so that it formed a continuation of the main manufacturing basement.

Since the areas of the basement columns were inadequate, in cross section to carry the additional loads which would be imposed on them, reinforced concrete shells were installed as shown in the photograph. This increased the effective section of the columns to such an extent that it was possible to construct the building extension without installing new pedestals and footings. Fortunately, the existing column footings were adequate to carry the new load imposed on them so no added work on them was necessary.



Reinforced concrete shells around each building column permitted the continuation of the plant expansion program

Now, Plant Modernization Programs
MOVABLE PARTITIONS

Plant Engineering
Product Application Feature

They're not new, but they are ideal for plants with often-changing production lines or shifting departmental layouts . . . Maintenance costs are lowered because soap and water do the cleaning, no repainting required . . . Varieties of finishes and styles available for office or plant . . . Wiring and other utilities can be incorporated in panel

WHILE POST-WAR construction has passed its peak, the ever-changing needs of industrial plants are emphasized by the full-blown trend to plant modernization and remodeling. At this time it is well for plant engineers to review some of the products which have been stand-bys in the past and now deserve a position of first-rank importance when renovating plant layouts.

Typical of such products is the movable steel partition. The primary purpose of any partition is two-fold; to define areas in plants and offices and to provide privacy and quiet. To these, the movable steel partition adds sound absorption, thermal insulation, dust-proofing, lightproofing (when desired), light weight and a choice of standard colors and finishes. These are plus values to which, in turn, can be added: lowered maintenance costs, low costs for re-installing in another section of the plant or office; long life, ease of servicing utilities which are concealed in the walls and the absence of dirt and plaster during installation and moving operations.

When a plaster partition has to be moved usually the only salvageable parts are the doors and frames, a small percentage of the entire material cost of the partition. The removal of the debris from knocked-down masonry walls often costs more than the value of the recovered material. Then, add to this the discomfort, inconvenience and actual damage which can be caused to machinery and furnishings by the dust.

Certain types of these movable partitions are more soundproof than tile and plaster walls which are more than twice as thick. A door usually transmits more sound than the adjoining wall but doors for the steel partitions have rubber-sealed frames which successfully cut down noise transmission. When glass lights are required in soundproof partitions, double glazing is recommended.

Wiring runs are made more accessible in the movable steel partition. Post cap and clips on either side of posts may be removed for lay-in

If you want to know more about these partitions, cost, sources of supply, finishes, types available, just write "Partitions" on the post card on pages 19 or 61. No postage required

When movable steel partitions like those shown are installed in the plant, office and laboratory . . .

Fig. 1. One step in the erection of partitions at Firestone Research Laboratory, Akron

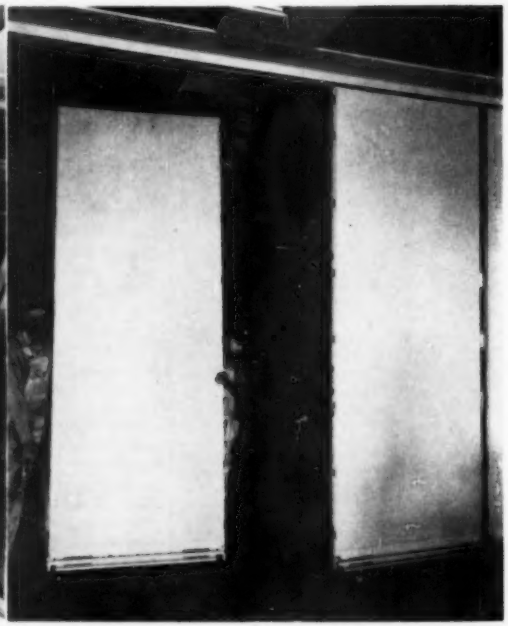
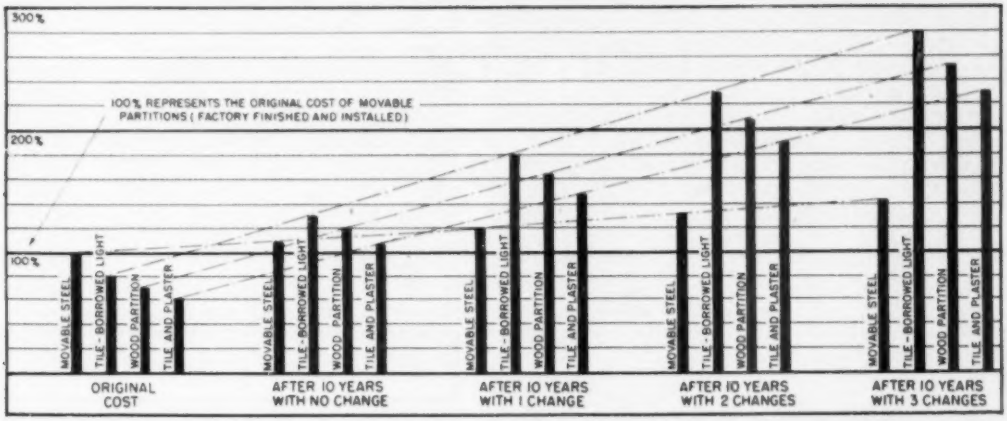


Fig. 2. Another type of panel going in at Firestone. Note absence of fuss and muss

Place Added Emphasis on These



The more changes made in the plant and on the production lines, the greater the comparative savings

Fig. 5. As the number of partition changes mounts the original cost of the movable partitions gets comparatively lower and lower. Even without partition changes, the lower cost of maintenance results in appreciable cost reduction

wiring. The posts are designed to accommodate standard interchangeable switch and outlet fittings, and the post caps are stocked with cutouts for switches or outlets. Thus, fittings are placed in easily removable and interchangeable members and the large panel faces are not impaired with electrical cutouts. Wiring can be pulled through the hollow bases of some types of partition and through the cornice of all types.

These partitions are manufactured in complete wall sections or units, from 7 ft to 11 ft in height, and in widths up to 60 in. Door units and panel units of the same width are interchangeable without disturbing other units in the run. The partitions give a wide choice of baked-on colors or wood grains.

. . . Utility servicing can be speeded up, costs cut down and maintenance made a just-once-in-awhile job

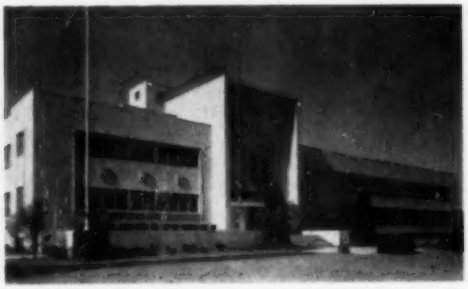
Fig. 3. Easy removal of steel pipe enclosures makes utility repair simpler than with other walls

Fig. 4. Post cap is easily removed to make repairs or additions to electrical facilities

Convenience, Flexibility Built Into "THE BEAUTIFUL NEW PLANTS"

The four plants shown on these pages were designed for highly divergent operations but they have one thing in common, the beauty that derives from perfect utility for a given job . . . Whether a maker of chemicals, oil, duplicating machines, or shoes, each plant was tailored to do its job efficiently, safely and, at the same time, to turn out a better product . . . Each plant, too, recognizes the industrial plant's responsibility to become a neighborhood asset, not a liability

Cincinnati Chemical Wks.



All photos, this page: The Austin Co.

Above: These motor-operated ventilating fans, on the roof of Cincinnati Chemical Works' new administrative and research center, speeds exhaust of process vapors and heat. The unit consists of two fans in tandem and delivers 100 per cent fresh outside air, which is filtered, to the laboratories. During the winter months the air supply is tempered by passing it over steam coils. Round Transite duct, installed above the lab hoods and at other points, facilitates the exhaust of vapors. Boilers and ventilating equipment have been located on the ground floor beyond the building line and are covered by a paved terrace in the building's court

Above: Every facility for efficient operation and maintenance has been provided in the design of individual laboratories. This analytical laboratory, for instance, has a series of four hooded laboratory benches at each end. The glazed tile walls and plastic tile flooring, together with the stoneware laboratory tables, reduce maintenance costs

Left: Air conditioning equipment, located in the basement, consists of two 60-ton refrigerating compressors which serve the 14 zones covered by the main conditioning system. This unit has been built as a multi-zone, hot-deck-and-cold-deck mixing system with individually controlled supply ducts for each zone. Low limit thermostats for each zone have been eye level mounted, on ducts for greater operating visibility

A. B. Dick Co., Chicago

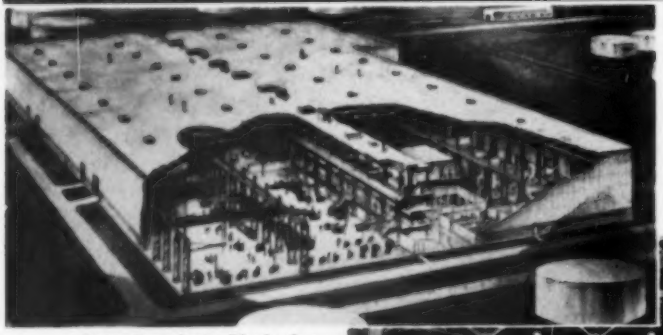
Right: This compact concentration of black-oxide finishing tanks in the plating department of A. B. Dick Co's. new plant illustrates the ease with which the designers were able to accommodate materials handling and other building equipment on the standard structural framework. Traveling monorail bridge facilitates handling of loaded tumbling baskets. All exhaust pipes are vented through a single manifold with a power-driven fan on the roof

Left: Heating and process steam requirements at A. B. Dick Co.'s new plant are met by these three stoker-fired boilers, which are equipped for gas burning in the summer months. The units are rated at 25,000 lb per hour and are fed by spreader type units from a 700-ton concrete coal silo which is directly adjacent to the boiler house. There are 43 heating and ventilating units in the plant, which handle 14,400 cfm of air and have heating capacities up to 1½ million Btu per hour providing frequent air changes

All photos, this page: The Austin Co.

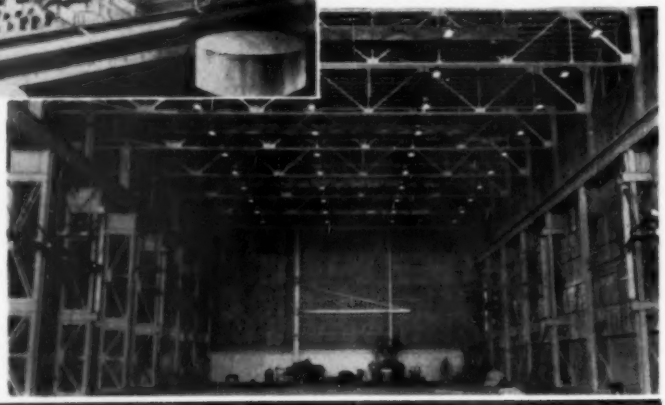
Right: A great part of the company's stencil manufacturing activities are now concentrated in two large air-conditioned, windowless rooms in one section of the new 454,000 sq ft plant. Shown here is the method by which the heat and vapors produced by the equipment are exhausted directly to the outside, while constant temperature and humidity are maintained by distribution ducts leading from the air conditioning equipment platforms to all sections of the department. Standard industrial fluorescent lighting units installed in this and other departments maintain illumination intensity of at least 30 ft candles at the various operator's working planes

Humble Oil & Refining, Baytown, Tex.



Photos: Owens-Corning Fiberglas Corp.

Left: Humble Oil & Refining Co's. new "controlled conditions" shop building, 720 ft long and 308 ft wide, will bring under one roof all of the refinery's repair and maintenance shops. It is a completely windowless structure with interior walls and ceiling designed for maximum sound deadening and light reflection. Specifications require that during the summer months the inside temperature shall not exceed 78 F under base conditions. In the winter, 72 F

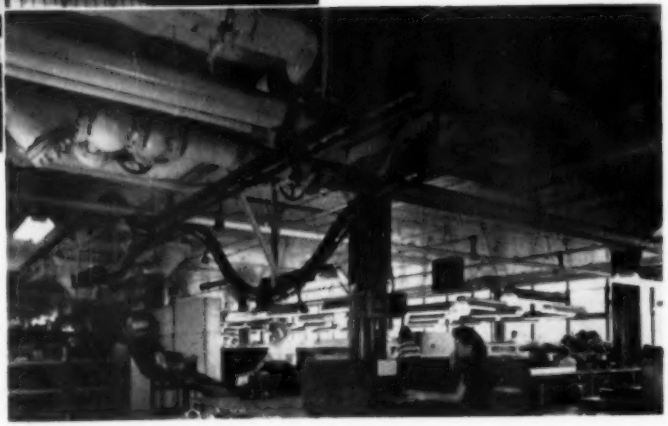


Right: One section of the "controlled conditions" shop which has already been completed. The entire shop is well fitted with materials handling aids, from jib cranes to monorails. The plant is completely air conditioned. At the present time one 550-ton and one 1100-ton centrifugal compressor are installed and room is provided for the installation of two additional 1100-ton units. The side walls of the completed first section are built up, from inside out with: expanded metal lath, Fiberglas materials and corrugated asbestos siding

Florsheim Shoe Company, Chicago

Photos: The Florsheim Shoe Co.

Left: The first factory to be built adjacent to Chicago's Loop in the last 10 years, the new Florsheim Shoe plant is a distinctive addition to its neighborhood. Two identical men's shoe manufacturing units are quartered here. The first of these units occupies the second floor and all of the third with the exception of the west wing where are located the employee cafeteria and first aid department. The second unit takes up all the fourth and fifth floors except for the west wing of the fifth



Right: Typical of the speed and efficiency designed in the building is the overhead conveyor employed to carry shoes through four different operations from raw leather to completely sewn upper, ready for the lasting operation. Combined with vertical floor-to-floor conveyors, the overhead conveyor eliminates altogether the transferring of shoes by hand truck throughout the six manufacturing floors of the plant

PAINT IS EXPENSIVE!

Here's How to Store, Mix and Tint It

Watch temperatures in storage . . . Isolate or protect for fire prevention . . . Directions for cement-asbestos board cabinets . . . Proper mixing of paste in oil, ready-mixed paints, enamels . . . Tinting procedures

GOOD PAINT is not a cheap commodity. It is compounded of costly materials, by well-paid workmen, is improved by constant research, is blended in modern plants. It comes out of the plant a quality product but one which reflects the cost of manufacture. This is in accord with economic laws, but the wastage and spoilage which is often allowed when it reaches the hands of the consumer hikes the total cost.

Proper handling of paint in storage makes it easier to use and cuts down on waste. If containers of paint are allowed to stand for some time the heavy metallic portions and the pigments will settle to the bottom. Workers employed in the paint storage rooms should turn the containers frequently, with the heavy end up. Red lead paste or prepared paints will harden if allowed to stay in storage for prolonged periods, during hot weather. On the other hand, never allow emulsion paints or water paints to be stored where they will be subjected to freezing weather.

Isolation of the paint storage area from the rest of the plant should be accomplished as a fire protection and prevention measure. Large quantities of paint should be stored in space protected by fireproof walls. Properly constructed storage cabinets may be used for small quantities of paint. If metal cabinets are not available for this purpose it is possible to substitute cabinets constructed of cement-asbestos board not less than 5/32 in. thick with bottom and walls of double thicknesses with a 1½ in. air space between the two layers. The doors, too, should be of double thickness with a raised sill 2 in. above the bottom of the cabinet. Doors should be provided with a suitable lock and should be kept closed at all times. A warning sign of some type should be placed on the door. The usual "Inflammable. Keep Fire Away!" should serve the purpose.

Cabinets or fireproof storage areas are not required for the storage of drums which conform to shipment specifications. If it is necessary, however, to use pumps for drawing the paint or liquid from the drums, these should be of a type approved by the Underwriters. Gravity spigots are undesirable. Self-righting tilting cradles are permissible but pumps are preferable.

Each paint material calls for different techniques of mixing. Some, like varnish and shellac, require no mixing inasmuch as they contain no pigments. If possible, all paint materials should be mixed in the paint room or mixing room. A mechanical agitator may be used if the quantity of paint handled by the plant is sufficient to warrant. If not, the use of strong, smooth wood paddles will result in good mixing. When using a paddle work the pigment up from the bottom of the container stirring until the pigment is completely blended with the liquid.

If the pigment has settled in a hard cake use a mechanical agitator if one is available. If hand stirring is necessary pour the liquid into another container and break up the pigment with the paddle. Pour the liquid back, a little at a time, until the mixture is homogeneous and then "box" it by pouring from one container to another until the pigment and the liquid form a smooth mixture.

White lead or colors in oil have the unhappy quality of forming skins on the surface of the liquid. To keep them soft and free from such skins scrape the lead or color from the sides of the container and fit a disc of paper snugly inside the container to seal the contents from the air.

As pointed out above, some paint materials require specialized mixing technique. These are outlined below:

Paste in Oil—After opening the container, mix in any free oil on top of paste and break up the paste until the mixture is smooth. Put the specified amount of paste into the mixing can and measure the linseed oil, thinner and drier as required by formula. Add oil in small quantities followed by the thinner and the drier. Next, strain this preparation through cheese cloth or a wire mesh to remove lumps or any foreign matter. This improves brushing qualities.

Ready-Mixed Paints—Place unopened cans (holding 1 gal or less) in a vibrator type mixer for 3 to 10 min. Stir paint in larger containers with a propeller type mixer. Make any required additions of oil, thinner or colors after the paint has been mechanically mixed.

Enamel—When mixing enamel use small propeller agitators or hand mixing methods. Mechanical agitators or shakers cause enamel to bubble or froth requiring a settling period of from 6 to 8 hr.

Concentrated color pigments made from natural earth or chemical compounds are mixed with oil to form a paste. Pigmented oil stains for wood are sometimes made by thinning colors in oil. To mix colors in oil with white pigment pastes it is first necessary to reduce the heavy paste to a semi-paste condition by mixing it with an oil thinner. Then thin the colors in oil with turpentine or mineral spirits to the consistency of canned milk.

This mixture is then added gradually to the paste, stirring constantly with a wooden paddle or propeller agitator until the desired tint is obtained. The remainder of the oil, thinner and drier is then added.

When tinting ready-mixed paints, reduce the colors in turpentine, as above, and then mix the paint thoroughly by boxing or with a mechanical agitator. Then add the color in small amounts, stirring after each addition until the desired tint is obtained.

If enamels are being tinted mix them well by hand or with a propeller agitator and add the color gradually until the tint is obtained.

Tinting colors are especially prepared in water for use with casein and synthetic resin-emulsion paints. These colors should be slightly thinned with water and thoroughly stirred into the paste paint. Mix casein powder paint with water to form a paste before adding thinned tinting material.

Cement water paints tinted on the job are seldom satisfactory.

Rubber Uses are Stretched

ADDITION OF rubber to asphalt for road building is the most notable new use of rubber. Although the usage is relatively small percentage wise it gives promise of utilizing tremendous quantities. A layer only one millimeter thick of rubber-asphalt composition is said to be all that is necessary to protect and seal a road construction of coarse asphaltic concrete and such a surface is said to have good anti-skid properties.

According to L. W. Brock, G. H. Swart and E. V. Osberg of The General Tire and Rubber Co., Akron, who addressed the ASME in New York, rubber is utilized in powder form and considerable attention has been given to rubber as a powder for various other applications.

One Way to Cut Air Conditioning Costs

Recovering conditioned air for recirculation . . . Use of activated carbon as a deodorizing agent . . . Analysis of savings effected by recovery of conditioned air to reduce the intake of fresh outside air

By J. H. BARTOL, W. B. Connor Engineering Corp.

AIR CONDITIONING, including heating as well as cooling, is no better than the quality of its air. Despite efficient dust filtration, dehumidification or humidification, and precise temperature control, much of this carefully treated air ordinarily has to be replaced with new outside air at regular intervals in order to maintain an agreeable condition. The rate of replacement depends solely upon the odor level within the space, which is related directly to the size of the area, the number of occupants and their activity. Lack of proper ventilation is the reason for the dank, musty, "refrigerator" odor so often characteristic of air conditioning.

A large room with few occupants will need but a small proportion of ventilation air. On the other hand, in a crowded area in which there is a considerable odor generation, the conditioning of the volume of fresh air necessary for good ventilation can well be the largest single factor in the cost of the air conditioning system, both from an investment and operating standpoint. The fact that ventilation can be very costly is a significant obstacle to air conditioning economy.

An inconceivably small amount of odorous substances are enough to make an entire atmosphere unpleasant. The actual percentage is less than 0.0001 per cent or 1 ppm of air. It is not unusual for some systems to regularly replace, or throw away, more than one-half of their costly conditioned air simply to get rid of this infinitesimal fraction of impurities.

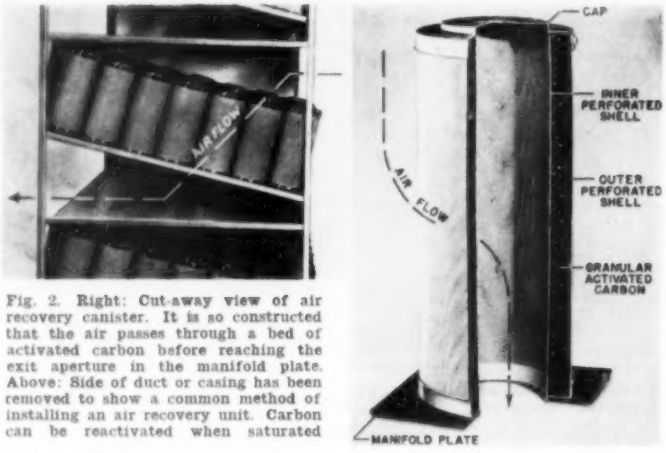


Fig. 2. Right: Cut-away view of air recovery canister. It is so constructed that the air passes through a bed of activated carbon before reaching the exit aperture in the manifold plate. Above: Side of duct or casing has been removed to show a common method of installing an air recovery unit. Carbon can be reactivated when saturated

New ventilation air is not, as often supposed, necessary to maintain an adequate supply of oxygen or to dilute the carbon dioxide accumulation. Air that enters through unavoidable filtration between doors and windows and even walls, or air that is drawn in to counteract such seepage, is more than sufficient for these purposes.

Using activated carbon to remove odorous gases and vapors from air so that it may be recirculated or reused, thus conserving money that has been invested in heating or cooling, is a development that is coming into increasing prominence in air conditioning practice.

That carbon is an excellent purifying agent has long been known. Marco Polo speaks of the Chinese using charcoal to purify sugar and it is likely that primitive man knew that if he threw ashes over a decaying carcass its stench would be lessened. It was not until World War I, however, when it was used in gas masks, that carbon had attention focused on it as an air purifier. In recent years much progress has been

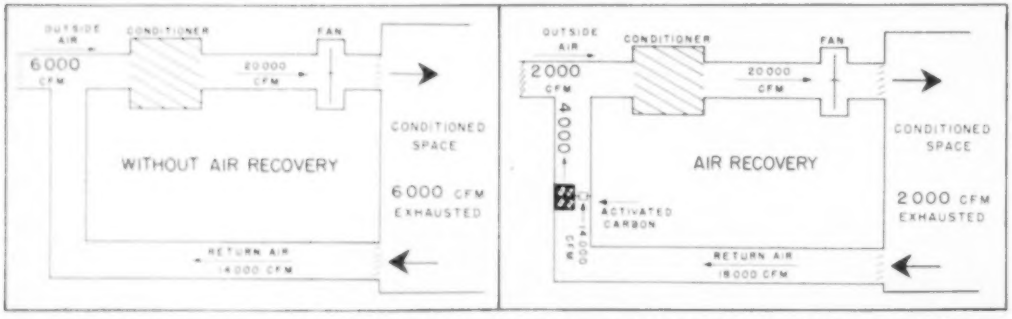


Fig. 1. Showing how recovery and recirculation of conditioned air reduces outside air intake two-thirds in a typical system

made in a broad adaptation of the air purification method, notably in air conditioning and certain industries.

Air recovery or purification relies simply on the natural phenomenon of adsorption, the condensation and adherence, in a thin layer of molecules of gases and vapors to the surfaces of solids. What makes activated carbon so useful as an adsorbent medium is its enormous surface area. The total surface in a cubic inch of the type used for air purification, which is composed of countless sub-microscopic pores or crevices, is estimated to be roughly equivalent to five acres. The word "activated" describes carbon that has a relatively great surface area and hence a corresponding "activity" for adsorption.

By circulating air through carbon any odors it may contain are removed, actually by a process of selection, as the chemical or physical properties of air are not otherwise changed. Thus, the need for new outside air is considerably lessened and its volume can be reduced to that necessary to offset leakage. A diagram of such a system is shown in Fig. 1.

Obviously air recovery can effect the greatest economy in air conditioning systems normally requiring large volumes of ventilation air, such as restaurants or cafeterias. In one such installation serving 863 persons, the design engineers specified a fresh air supply of 20 cfm per person or a total of approximately 17,000 cfm. However, 7,000 cfm of this volume is new outside air and 10,000 cfm is recirculated air deodorized through 400 activated-carbon-filled canisters. The unit, in effect, does the work of 25 t of installed refrigeration capacity (2.5 t per 1,000 cfm). As the cost of cooling equipment is estimated at $300 per installed ton of capacity, there was a gross saving of $7,500. Subtracting $2,000, the cost of the air recovery installation, the net saving was $5,000. Figuring in amortization and interest, annual operating costs are reduced by roughly $500. Both estimates are for the cooling cycle only as heat is supplied by the building.

Table I. Comparison of cost of air recovery with cost of conditioning outside air

Cost to Condition 1,000 cfm Outside Air Per Annum	
Cooling equip. 2½ tons @ $300	$750.00
Heating equip. 80,000 Btu × 0.0025	200.00
Capital Investment	$950.00
Power: 1¼ tons × 1 kw × 1,200 hr × 0.02	$ 30.00
Fuel: ½ gal × 3,000 hr × 0.08	120.00
Water cooling: evaporation loss and pumping cost	19.00
Operating Expenses	$169.00
Cost to Purify and Recover 1,000 cfm Recirculated Air Per Annum	
Air Recovery Type C Cell	$137.50
Shipping and installation	40.00
Capital Investment	$177.50
Carbon Reactivation Service (Maintenance)	$ 25.00
Shipping and Labor	8.00
Operating Expenses	$ 33.00
Capital Cost Saving ($950.00 — $177.50)	$772.50
Yearly Operating Cost Saving ($169.00 — $33.00)	$136.00

In another such installation, all the air in the air conditioning system passes through activated carbon odor adsorbers. Of the total fan volume of 18,500 cfm only 30 per cent is new outside air, 12,950 cfm being recirculated. Had all the air, or a greater percentage, been brought in from outdoors, a much larger conditioning plant would have been required. By treating the fresh air from outside as well as the return air, there is no possibility of any vagrant odors being drawn in.

Variable design conditions, climatic and other considerations make it impossible to establish a definite percentage of savings which will apply in all air conditioning installations and, in fact, whether or not air recovery is practical. The only yardstick is a cost comparison between treating the volume of outside air necessary and recovering an equivalent volume of indoor conditioned air. It is evident that where the cost of heating or cooling outside air is greater than recovery, the latter should be used.

Based on average temperate zone conditions, average size air conditioning installations and average equipment cost, and using the recently developed cell-type of odor adsorber, a typical cost comparison is shown in Table I.

These savings are possible of course only when air recovery is part of the original system. Often, however, it is possible to improve ventilation when conditioning capacity is lacking to handle more outside air. Or the capacity of a system may be increased by cutting down the outside air volume and substituting recirculated but purified air.

Depending upon the weight and concentration of the odors the carbon must adsorb, it will in time become saturated. When this occurs reactivation is necessary, usually when the weight of the adsorbed gases and vapors is approximately 20 per cent of the carbon itself.

Where all the air is to be deodorized in passage, double walled cylindrical canisters which fit into a supporting plate, shown in Fig. 2, are employed. The canisters have an average capacity of 25 to 35 cfm. Another "cell" type of unit, with a capacity of 1000 cfm, has a frame of the same dimensions as standard dust filters.

While the most general application of activated carbon air purification is in connection with air conditioning, it is being used in many applications for simple odor removal to protect people, products or processes. An interesting industrial application is shown in Fig. 3.

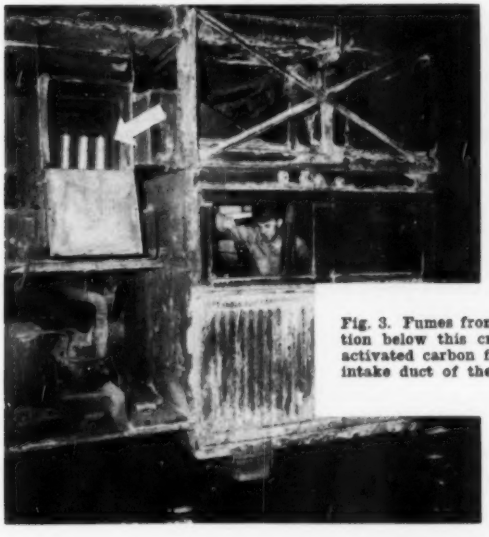


Fig. 3. Fumes from the smelting operation below this crane are trapped by activated carbon filters (arrow) in the intake duct of the cab air conditioner

RECORD STORAGE Can be Improved

The material in this article has been gathered as results of surveys of practices of industrial and business concerns throughout the country . . . One individual should be appointed to be responsible for the preservation of records and also responsible for their destruction . . . Written authority should be given by the individual in charge before records are destroyed . . . These schedules of records for destruction should be kept permanently . . . Suggested layouts for record rooms and indexing and serial numbering methods for storage are presented

By JOHN E. FELLOWES, Vice President, Bankers Box Company

IT IS ADVISABLE to appoint one individual who will be responsible for the preservation of records and likewise responsible for their destruction after they have been kept for the prescribed length of time. By this we do not mean that this particular individual should carry out the details of record storage and destruction but should have the responsibility for determining their value to the company.

When a group of records has been in storage for a prescribed length of time and if they are no longer useful to the company this individual should be presented with a list of the records to be destroyed along with their description, and he should give written authority for their destruction. These forms which give the written authority should be preserved permanently. It is a good idea to prepare a form for scheduling these records ready for destruction with a place for the appointee's signature.

Should records that are listed for a definite period of retention be accidently destroyed the person in authority having complete facts surrounding their destruction should make out a report listing as far as possible the records destroyed, and the facts regarding their destruction and forward this report to the individual responsible for the preservation and destruction of records. After this report has been reviewed and checked by this individual they should be preserved permanently.

The facilities available generally determine the most satisfactory types of record rooms. The best location which your plant has to offer should be selected. It should, preferably, be one which is separated from other business and plant activities and one which is as clean as possible. Lay out an arrangement for shelving which is neat and orderly; one which utilizes every inch of storage space yet provides ample room for quick access to any record stored.

As shown in the accompanying drawing both the shelving and the boxes are drawn to scale. There are many advantages in selecting files or boxes for storing records that are specially constructed for that purpose. Such boxes come provided with labels with the proper "contents" information. In addition to filling out these labels, the serial numbering method should be adopted. Under this method each box is assigned a number as the records are placed in it. Records of the same character or having the same title should be grouped and each group should start with No. 1. Keep an index record by titles of everything in storage, showing title of record, where located and serial number of box. Location of any particular record then is easy and the serial number assures return of the box to its proper place.

In the larger storage rooms the practice of numbering sections or tiers as well as shelves is often followed. In such case it is a simple matter to add to the record in the index the section number and shelf number. The destroying date should be determined when the records are put into storage and this date put on the label and also listed in the index. By using this indexing and serial numbering method, or a similar method, you will find that it cuts "look up" time to a minimum, aids in keeping storage room in order, and makes it possible for any individual to find a given record instead of depending on one person who is familiar with the storage room.

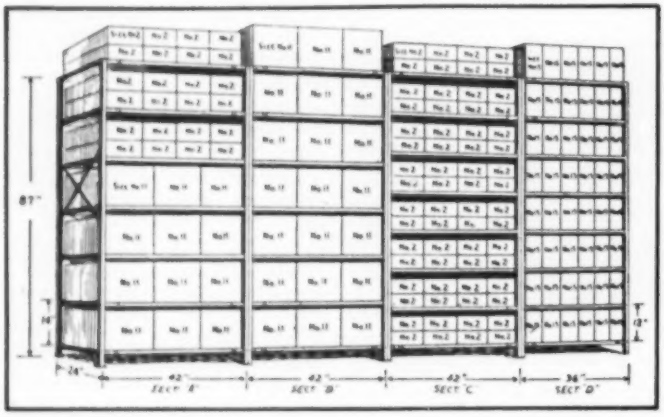


Fig. 1. This drawing shows how various size shelving may be used to advantage in the storage of records. Various sizes of boxes are available for filing

Both shelving and boxes shown here are drawn to scale. The first three sections are 42 in. wide and the last one 36 in. The large boxes in sections A and B are letter size. The small boxes in sections A and C are check size. The boxes in section D are standard document size. Section A represents a small installation where it is necessary to store more than one kind of record in the same section. Section B and C represent one type of record to the section. Note that large boxes are one high on lower shelves and smaller ones are two high which assures quick and easy reference

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Maintenance and Operation

Magnetism Helps in Wire Fishing

Contributed by W. E. Warner

UNDER CERTAIN conditions (which nearly always exist) the job of fishing for electric wires is one of the toughest electricians have to contend with.

I have found that the job can be considerably simplified if a magnetized steel wire is used for the fishing and a short turn of steel wire is wound around the wire being fished for. This will work all right except when metal lath has been used in the construction of the building.

Aluminum Pipe Jackets At Southwestern Oil

ONE OF THE outstanding advantages of a newcomer to the insulation jacketing field is that of lowered maintenance. Specifically, the development consists of 0.0055 in. corrugated aluminum foil bonded to an insulating barrier. Incidentally, the foil is available without the moisture barrier for application on certain types of insulation such as cork or Foamglas.

Photo: Aluminum Company of America

Overhead lines of all sizes are covered with aluminum jacketing at the Corpus Christi refinery of Southwestern Oil and Refining Co. The plant was designed by Process Engineers, Inc.

The jacketing and barrier are attached in one operation and are said to be easily applicable around turns and bends, flanges and connections. Most installations of the jacketing are secured by means of a plastic adhesive tape; some are secured by aluminum fastening strips and sheet metal screws. The material is shipped in rolls which are 4 ft wide by 100 ft long and it is cut and applied on the job.

Trouble-free life of 20 years has been estimated for the jacketing even when exposed to weather. This eliminates painting and frequent replacement cost.

Ladle-Pouring Truck Increases Production

BY UTILIZING a fork truck equipped with a rotating carriage for pouring, one Southern iron works has increased pouring operations approximately 50 per cent and decreased work-hours 50 per cent. The truck moves from flask to flask pouring molten metal as required. The entire

Move the Desk and You Move the Partition

DEVELOPMENT of a new "private" office for open areas of buildings is made possible by a new type of functional furniture built into a complete working unit which carries its own partition for privacy and prestige. Considered a big improvement over the conventional desk-and-table arrangement, it was designed for the convenience and ease of individuals. This was determined by lengthy time-and-motion studies of how men work at their desks.

The Du Pont Engineering Department designed and built these units for a number of its employees but there are none on the market so far as it is known. As the company is not in the furniture business, it has no plans to make any for sale.

Basic element in the system is an L-shaped desk with partition attached. This arrangement, with a desk-height file attached, gives a person the equivalent working area of the conventional desk-and-table set-up. It is all within easy reach. A shelf can be added at the back to provide the equivalent of a conventional bookcase, within arm's reach of the person at the desk. If more filing space is needed, it can be added readily, so complete flexibility of filing is an integral part of the system.

A partition is included as part of the unit but can be eliminated if desired. Partitions may be of glass, plywood, or other material. They are 6 to 7 ft high and run whatever length is desired. Not only does the arrangement provide privacy and cut down noise, but has the obvious advantage of permitting partitions to be moved simply by moving the desk units.

By using the new units in open-area offices, Du Pont has been able to achieve space economies and at the same time gain in working comfort and convenience.

These unit partitions, desks, filing cabinets, bookcases, working areas, permit greater flexibility of the office and, at the same time, provide necessary privacy. Note that bottoms are open to facilitate ventilation and cleaning

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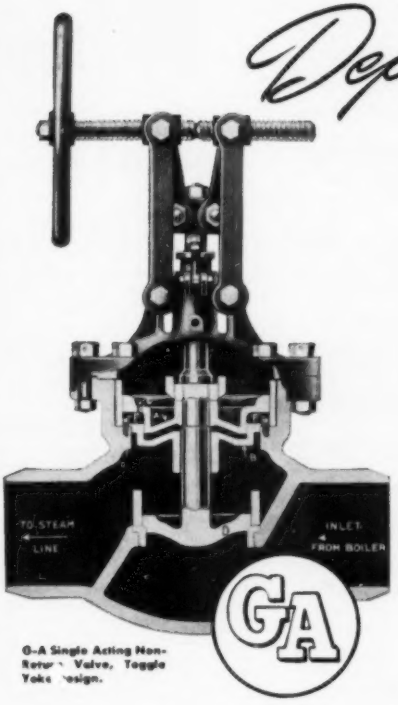

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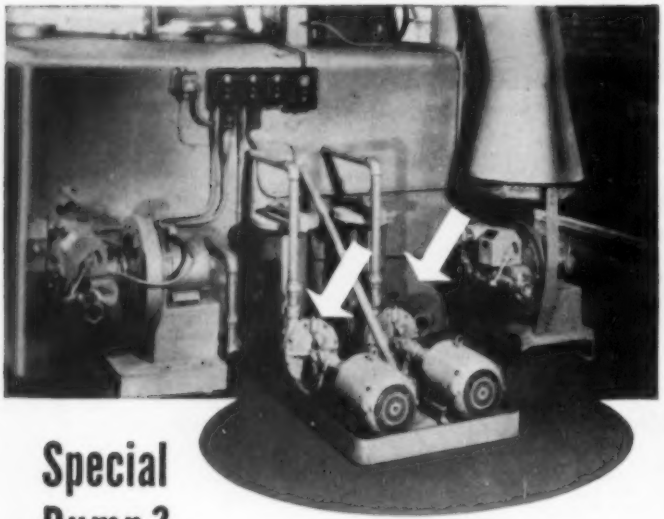

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4010A	Single Stage, Side Suction, Single Ball Bearing Centrifugal Pumps with separate liquid end construction. Sizes 1" to 10" discharge. Capacities: 10 to 3600 gallons per minute.
4012A	Single Stage, Side Suction, Two Ball Bearing Centrifugal Pumps with separate liquid end construction. Sizes 1" to 10" discharge. Capacities: 10 to 3600 gallons per minute.
4013A	Single Stage, Side Suction, Two Ball Bearing Centrifugal Pumps. Sizes 1" to 6" discharge. Capacities: 10 to 1200 gallons per minute.
4303	"Motor-Mount" Centrifugal Pumps, 63 standard sizes. Capacities from 5 to 650 gallons per minute.
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operation is performed by the truck operator. He rotates the ladle to keep a constant flow of metal to the mold.

The ladle has fabricated around its base four hollow rectangular steel tubes which permit the forks of the truck to pick up the ladle from any

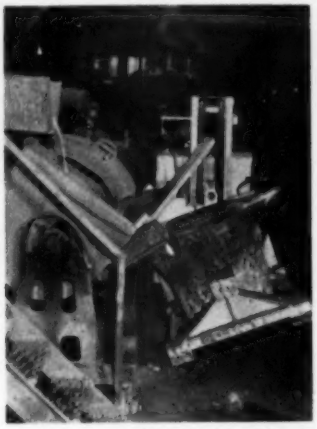


Photo: Yale & Towne Mfg. Co.

Equipped for fork truck handling, ladle is tilted to receive molten metal. Fork truck is used for other handling operations when not transporting metal

one of four directions. The tubular construction prevents the ladle from falling off the forks as it is tipped for pouring. Photo shows the ladle construction as it is being filled prior to pouring into the molds.

The 360 deg rotor has two speeds, the slowest speed giving added control when pouring metal. The ladle holds 4,150 lb and is 34½ in. in diameter by 39 in. in height.

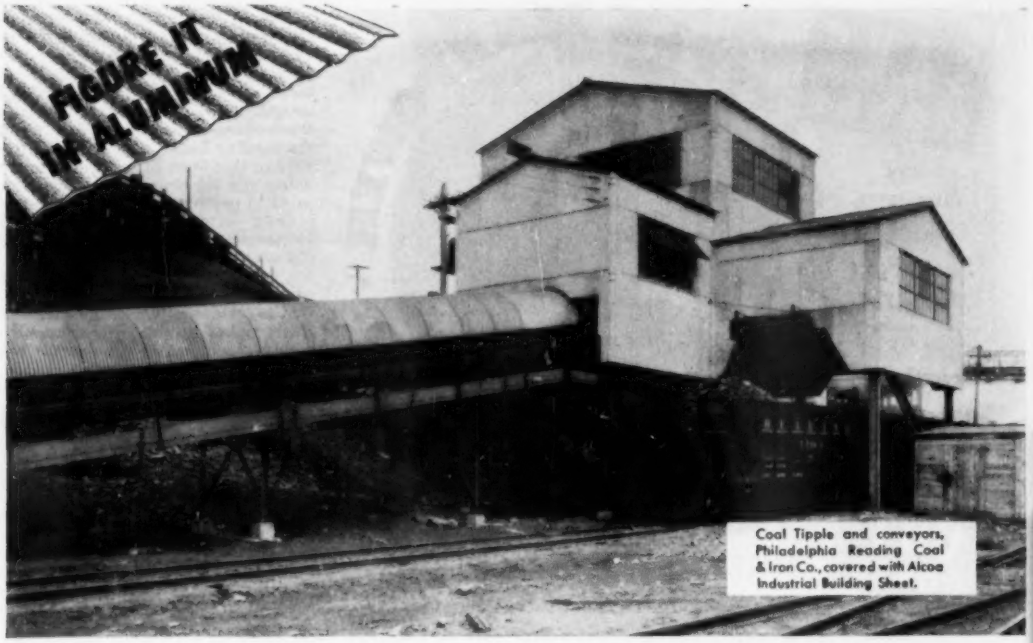
Gold From Industrial Waste Waters

Contributed by Sam Tour
Consulting Engineer

EVERY DAY, thousands of dollars worth of gold goes into the sewers along with the waste waters of the precious metals fabricating industry. This is a needless loss of gold and in many instances is the difference between profit and loss in manufacturing operations.

In the manufacture of rolled gold plate, watch cases, spectacle frames, high grade jewelry, etc., there are many pickling, washing, polishing, tubbing, cleaning and electro-plating operations. Fine particles of gold in suspension and considerable gold in solution go down the drains with the waste waters and solutions from these operations.

In some plants the drains go to settling basins in an attempt to catch the gold in suspension. Only the heaviest particles are caught in this fashion as the soap and cleaning



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agents in the waste water prevent the finer particles from settling out. Only in a few instances where expensive filtering equipment has been installed are these finer particles caught. In most cases, they go down the sewer with the overflow from the settling basin. The value of the gold in this form in the waste water going into the sewer may be as high as $1.00 per ton of waste water.

Only in connection with gold electroplating operations does the industry make an attempt to recover the gold that is in solution. In most cases, this recovery attempt is limited to a rinse in water to be reused. Such rinses are notoriously inefficient. In some cases, recovery is attempted by the use of "zinc boxes". Troughs or tanks are loaded with zinc shavings and the waste waters are percolated or allowed to flow through these boxes en route to the sewer. Ordinarily, such zinc boxes recover only 30 to 40 per cent of the gold in the water and the balance goes down the sewer. Gold in this form going to the sewer may be as high as $3.00 per ton of waste water.

In cooperation with the Merrill Co. of San Francisco, our firm has adapted a precipitation process for the treatment of waste waters in the plants of the precious metals fabricating industry. In this continuous automatic process, the waste waters are pretreated, clarified, deaerated and the gold precipitated and collected in a form ready to be melted direct. A pilot plant for demonstration of the complete system and capable of handling about ½ ton of water per hour can be demonstrated in our laboratories, or can be installed in a prospective user's plant for a trial run. Production or full scale installations handle 2 ton or more of waste waters per hour on a continuous 24-hr per day basis. The installations are automatic in operation and require little attention, an average of less than 1 man-hour per day. All fine particle gold in suspension and gold in solution is recovered down to 10 cents per ton of the water going to the sewer.

Removing Tar From Wood Blocks

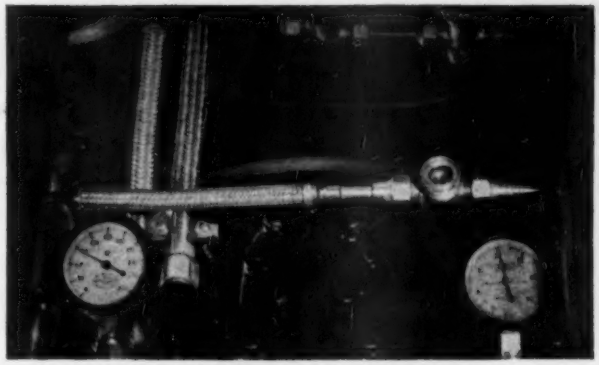
Contributed by W. E. Warner

ONE TIME I was faced with the problem of removing the tar from a considerable number of wood flooring blocks. I discovered, after a little experimentation, that the most effective method was to heat the blocks to approximately 140 F and then place them in a large tank from which the air could be partially exhausted to create a slight vacuum.

The heat melted the tar and the vacuum decreased the pressure on the surface of the block sufficiently to allow the tar to be forced to the surface for cleaning.

(Continued on page 54)

to block vibration and noise



American Vibration Eliminators prevent transmission of vibration through the piping from the compressor of this alternating heating and cooling unit.

Whatever your piping problem, whether it's vibration, misalignment, connecting moving parts or making connections in cramped spaces, there's a type and size of American *Seamless* Flexible Metal Tubing or American Strip-Wound Flexible Metal Hose to meet it. They include designs for carrying almost every type of fluid, gas, semisolid and steam.
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ANACONDA

American

FLEXIBLE METAL HOSE AND TUBING

Emergency Forging of Hooks

Contributed by
H. Mack

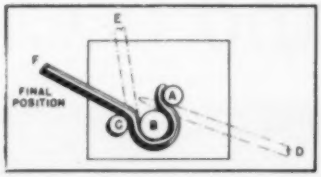
JUST IMAGINE yourself in such a position: Your company has just received a contract to build sectionalized, demountable houses for a government project. An overhead tramrail is built for conveying the sections through the many operations of assembling, sanding, spray painting, fitting of doors, windows, etc. To do this, the production department needs several hundred iron or steel hooks to attach the heavy sections to the trolleys of the monorail. Specialty job shops in town are too busy to take on the job. What would you do?

A company was faced with just such a problem and turned it over to their maintenance crew to design jigs, fixtures and methods to produce these special shaped hooks.

These hooks had to be pointed and then specially bent to permit easy attachment of sections to the trolleys. Dies and jigs had to be made to finish forge this point and bend it to a proper and uniform shape. The point had to be finished with a fuller and hardy and the taper recess filed in mild steel.

To solve this problem of shaping a hook, they devised a heavy plate, (see sketch) anchored solidly to a heavy block, through which were bolted two forming pins A and B. A third pin C was left loose enough so it could be readily removed from the plate when necessary during the operation.

The complete process involved the following steps: **First Step.** A dozen blanks were heated in a slow heavy forge fire, shaped like a dome or beehive. An almost continuous operation was assured by adding a cold blank every time a hot one was removed. **Second Step.** After a blank of $\frac{5}{8}$ in. round had reached the



Sketch of device which company used to shape hooks for emergency use

forging heat, the point was rough forged on an anvil with a few blows of the sledge. Then the point was finish forged with a fuller and hardy. **Third Step.** The point was then placed between pins A and B in position D. A single light blow of the hammer was given to the just finished point around pin A. It was necessary that the blow strike near the point, where there was no solid backing to resist the blow and so deform the point. **Fourth Step.** A piece of $\frac{3}{4}$ in. pipe, of sufficient length to form a good lever, was slipped over the end of the blank. The hot stock was then wrapped around pin B to position E. During this operation pin C is removed from its position. **Fifth Step.** Pin C was replaced and the hook shank bent back around it to position F, completing the operation with a single heat.

After this final operation, pin C is removed to permit the release of the finished hook and the jig is ready to repeat the operation.

Handling Drums Safely

Contributed by
Westinghouse Elec. Corp.

STORING A DRUM of thinner on the top rack in the paint storage room of the Westinghouse Electric Appliance plant in Mansfield, Ohio, is done easily and safely with a floor-operated bridge crane and a movable ladder. Other safety features of this paint room are: Use of vapor-proof electrical fixtures and fittings; use of spark-proof floors and tools; installation of exhaust fans to maintain concentration of vapors below explosive point at all times; use of spring-closing valves on drums where it is necessary to make withdrawals; and use of drip pans under valves to prevent spread of thinner and fast evaporation.

AIRMOVER - the "open roof" method of industrial ventilation

Lowest cost per sq. ft. of opening

Only 32" high, this remarkable modern ventilator spreads over as much of your roofs as necessary, according to the need. Uses no power — air flow is *natural* (gravity) with least possible air friction through roof.

Each AIRMOVER unit 10' by 7' 6" provides 30 sq. ft. of free opening. Installs readily on old or new buildings. See our demonstrator model. Write to 18511 Euclid Avenue, Cleveland 12, Ohio for catalog of AIRMOVER and other Swartwout Roof Ventilators. Ask for Bulletin 335D.

The Swartwout Co.

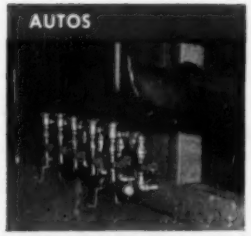
Industrial Ventilation Specialists Since 1904

Equipment for *Controlled* Air Circulation

WHAT ARE YOU PAYING *for Condensate?* $ $ $ $

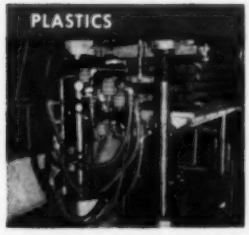
If your steam heated equipment is not supplied with hot, dry steam kept in intimate contact with the heated surface and free from air, you are paying for fuel that is being thrown away every hour.

Worse yet, you are paying double in lost production and rejects, if your equipment is not properly trapped and vented.



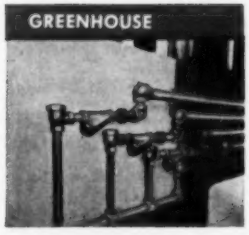
$ LOST TIME

Heating up time was reduced from 3 hours to 1 by using Sarco No. 9 Thermostatic Traps on enamel ovens in a large auto body plant. This trap has large air venting capacity. Removes condensate at 10°F below steam temperature.



$ REJECTED GOODS

With seven platens on this large plastics press, the weakest link (one cold section) made rejects frequent and without notice. Now seven Sarco Bucket Traps kick out the condensate and provide trouble-free production. This trap is ideal for releasing condensate as quickly as it forms—a must on plastics presses.



$ LOST FUEL

Most manufacturers don't know how much fuel they are losing due to inefficient trapping. In greenhouses, where fuel is a large part of the cost, monthly fuel bills tell the story fast. This greenhouse saved 30% of the fuel and 60% of the make up water by using Sarco Thermostatic traps on every line and every coil.

FOUR TYPES OF SARCO STEAM TRAPS TO CHOOSE FROM

Sarco makes all accepted types and can fit the trap to the job. Ask for trap selection chart No. 1600.

THERMOSTATIC

FLOAT-THERMOSTATIC

BUCKET

LIQUID EXPANSION

SARCO SAVES STEAM

SARCO COMPANY, INC.

Represented in Principal Cities

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IMPROVES PRODUCT QUALITY AND OUTPUT

More Mop for Your Money

It takes a laboratory to control production of mop yarns that absorb water rapidly yet give long wear.

Only at The Fuller Brush Co., will you find this complete control of mop quality.

Fuller's constant laboratory analysis of mop yarns includes two close-tolerance twist tests, two tensile strength tests, water absorption tests for quantity and for speed, wear test and shrinkage test. Fuller writes the yarn specifications and has worked closely with the same textile mills for over 25 years. Consequently, in every Fuller mop you can depend on (1) long wearing quality (2) greater water absorption and (3) high speed rinsing—which means cleaner yet faster mopping.

NOW AVAILABLE in limited quantities
Mops of Cellulose Yarn for Smooth floors

INDUSTRIAL DIVISION
The FULLER BRUSH Co.

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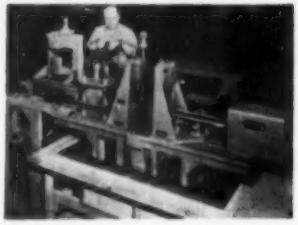
New Products and Methods

WHAT'S NEW? On these pages the Editors summarize the outstanding industrial developments of leading manufacturers who will supply you, free of charge, the bulletins or other information desired. For ease in making requests use the no-obligation, postage-paid card, pages 20 and 61

1—HARDENING EQUIPMENT

For continuous r-f selective hardening of cylindrical parts

Designed for feed rates to 6 in. per sec, this consists of an automatic loading device, a horizontal rotating scanner, and an industrial radio-frequency generator. The loader, consisting of magazine and hopper, feeds pieces to be hardened to the scanner through a feeder unit. Equipment hardens by passing work through an inductor coil and spray quench ring.



Uniformity of case depth is obtained by controlled feeds, manufacturer states, and concentricity assured by positive guide and rotation of the cylindrical work piece about its longitudinal axis. Equipment can be used to harden parts in desired hardness pattern by adjustment of electronic timing circuits. Westinghouse Electric Corp.

2—CONVEYOR BELT

Is rubber covered, constructed for handling hot materials

This belt is made with a carcass of multiple plies of glass fabric and a cover compounded especially to resist heat. It is claimed to be exceptionally long wearing

where heat is a problem. Company says it comes in any width and ply needed. Republic Rubber Div., Lee Rubber & Tire Corp.

3—PLATE TYPE RHEOSTAT

In three forms; suitable for wide range of industrial uses

Furnished in a 6-in. form (27 resistance divisions); 9-in. form (52 divisions), and 12-in. form (70 divisions), this rheostat is designed for field control of d-c shunt- or compound-wound motors, self-excited generators, exciters, separately-excited generators and synchronous motors. It is recommended for use in paper, textile, machine tool and other industries as well as by rotating equipment and motor-generator manufacturers.

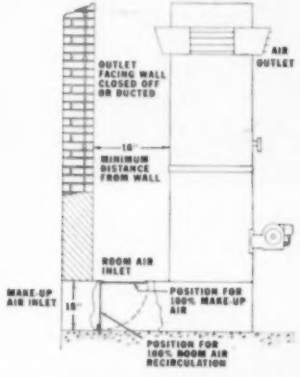
This rheostat features stops which limit dial switch movement at each end of travel, and are adjustable through a 90-deg angle and to adjust the maximum and minimum resistance possible to cut in or

out of the circuit. Handwheel operating mechanisms and sequence drives are intended to allow two plates to be operated in sequence. Detachable conduit boxes are optional for open type plates and standard on enclosed plates. Rheostat is enclosed in steel, except in dial area. Control Divs., General Electric Co.

4—DIRECT-FIRED HEATER

Is self-contained unit for tempering make-up air

A new model Thermobloc is announced as well suited for tempering of make-up air where a ventilating system imposes heavy loads on the heating plant in cold weather. When ventilators are at work, manufacturer points out, air to make-up for the volume ventilated off must enter


AIR OUTLET
OUTLET FACING WALL CLOSED OFF OR DUCTED
18" MINIMUM DISTANCE FROM WALL
ROOM AIR INLET
MAKE-UP AIR INLET
18"
POSITION FOR 100% MAKE-UP AIR
POSITION FOR 100% ROOM AIR RECIRCULATION

the building. To combat the overload caused by infiltration by cracks and doors, Thermobloc units can be positioned along the walls with air intake duct running through the wall. This feeds outside air to the units where its temperature is raised before it is discharged into the working area. Unit is designed to temper make-up air whether used as a plant heating system or as an auxiliary unit. Prat-Daniel Corp.

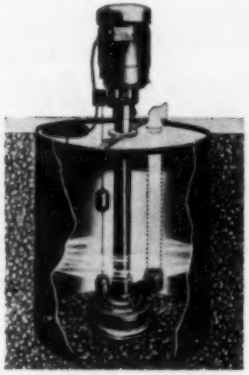
5—SUMP PUMP

In two models, both in lengths for 2, 3, 4 and 5 ft sump depths

The Figure 4607 Sump Pump is available with ½ hp motor for capacities of 60, 48, 35 and 20 gpm, and with ⅓ hp motor for capacities of 80, 72, 62, 50 and 35 gpm, against respective total heads of 15, 20, 25,

30 and 35 ft. Complete units are ready to stand on bottom of sump basin or in tile and have 8 ft extension cord for connecting to light socket.

Centrifugal type pump has bronze impeller fastened to stainless steel shaft by a key and brass acorn nut. A bronze bearing supports shaft. Motor is 115-230 v a-c,



60 cycle single phase, 1750 rpm. Float switch has two-pole snap action silver contacts. It is operated by two small weights described as non-breakable and chemically inert. Strainer is perforated brass. A cast-iron sump cover is optional extra. The Deming Co.

6—PRECISION SWITCH

For heavy duty applications, has plate-type actuator

Described as splash-proof and designed for locations subject to the splash of oil, water, and coolant, this switch is also said to be advantageous on equipment where operator safety demands two-hand control switches. Housing is rugged and has a gasketed

cover plate and closely fitted actuator shaft through housing wall intended to protect enclosed switch unit. Electrical rating is 15 amp, 125, 250, or 460 v, a-c. Circuit arrangement is single-pole, double throw. Micro Switch.

7—WORK GLOVES

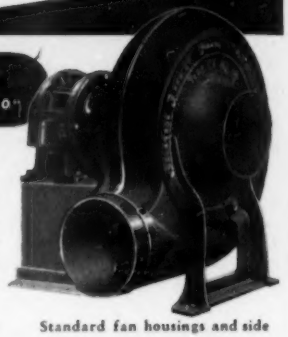
Have fingers and thumbs molded to natural position and curvature

Described as oil, chemical, cutting, and abrasion resistant, these Neox-coated gloves

Good Horse Sense . . . to Use These HEAVY-DUTY CLARAGE FANS

TYPE CI EXHAUSTERS

Capacities to 4000 CFM; Pressures to 20"



Nothing shoddy or flimsy about these smaller Clarage industrial fans. They are O.K. for continuous service — built to the *same exacting standards* as the largest Clarage equipment.

Try them! . . . then you will readily understand why we call them "HEAVY-DUTY" — *and mean just that!*

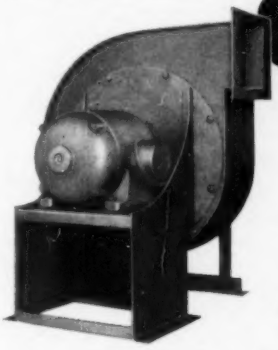
Use Clarage Type CI Exhausters for removing excess heat, dust, smoke, odors from any manufacturing operation — for supplying air to oil burners, as over-fire fans, etc. Use them for pneumatic conveying.

Fans also can be furnished gas tight, rubber covered, or with vulnerable parts of stainless steel or Monel — in fact, *in any construction* your special needs demand.

Standard fan housings and side plates are cast iron, long wearing, long resisting to corrosion. Heavy steel plate wheels are perfectly balanced. Fans in each of the 6 sizes can be V-belt or direct motor driven.

TYPE O BLOWERS

Capacities to 30,000 CFM; Pressures to 35"



Another Clarage HEAVY-DUTY industrial fan! Use Type O Blowers for *high pressure* applications — supplying air to cupolas, gas and oil burners, etc. Fan housings and wheels are heavy steel plate equal to severest conditions. Built in 19 sizes, operating at speeds *most economical* for direct motor or steam turbine drive.

WE ALSO MAKE:

LARGE INDUSTRIAL FANS
AIR CONDITIONING EQUIPMENT
AIR WASHERS UNIT HEATERS

CLARAGE FAN COMPANY — *Kalamazoo, Michigan*

CLARAGE

—HEADQUARTERS for Air Handling and Conditioning Equipment

SEE OUR CATALOG IN SWEET'S

It pays to direct fan inquiries our way . . . phone Clarage office in your city, or write us at Kalamazoo.

Application Engineering Offices in All Principal Cities

Introducing

DAMPNEY MAINTENANCE FOR METAL

Unless your corrosion problems have involved power equipment, you may not know the name, "Dampney." For thirty-two years now, we've concentrated our protective surfacing activities on steam-generating and associated equipment — stationary, locomotive and marine — and have established our Apexior and Thur-Ma-Lox coatings as standard in that service through consulting-engineer specifications, equipment-manufacturer recommendations, and, most important, customer use and satisfaction.

But corrosion respects no arbitrary division between power and processing equipment, and operators, recognizing like conditions of service, have, for example, extended Dampney wet-heat protection from boilers and turbines to sterilizing retorts, bonderizing and parkerizing tanks, or steam accumulators. And when one product proved outstandingly successful, they have turned to us with other corrosion problems.

Because ours is a specialty coating business, we have been able to individualize our approach to these problems . . . to adapt to specific needs not only our established materials, but the best of the newer synthetics, with vinyl and silicone formulations now available to extend the scope of our service.

•

And now, may we have an introduction to some of your really severe corrosion problems? We don't pretend to have all the answers, but we do promise a prompt, intelligent appraisal with an excellent chance that we'll be able to make some helpful recommendation.

96-1

MAINTENANCE FOR METAL

THE DAMPNEY COMPANY OF AMERICA

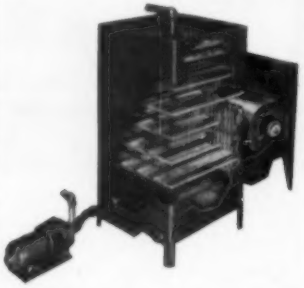
HYDE PARK, BOSTON 36, MASS.

are now molded to natural position and curvature of thumb as well as fingers and have a wider space between thumb and first finger. These design improvements are said to give greater comfort and firmer grip, reducing fatigue. Edmont Mfg. Co.

8—COOLING TOWERS

Induced draft type, feature high cooling, quiet operation

Type E Cooling Towers are intended for use with small "packaged" water cooled air conditioning and refrigeration condensing units. They are shipped assembled, except for air propulsion unit which is separate. They're made of galvanized steel and available in a wide range of capacities.



Towers may be installed outdoors, or indoors in well-ventilated areas. Discharged air is vented to outdoors through a duct. Separate motors operate blower and water circulating pump, and a full range of pumps and pump motors is available with the towers to meet requirements of refrigeration unit and pumping head. Binks Mfg. Co.

9—UNIT HEATER

For vertical delivery of heated air from heights of 9 to 25 ft

Six models offered have heating capacities, on the standard rated basis of 2 lb steam and 60 F entering temperature, ranging from 50,800 to 257,000 Btu per hr. With higher steam pressures and other entering air temperatures these capacities are increased.

Three-point suspension from adjustable swivel couplings is intended to simplify suspension and alignment. Supply and return piping connections are on one side for compactness and economy. Permanent built-in pitch for each U-tube is provided for continuous drainage and permanently bonded individual square fins for uniform heat transfer. Electric motors are built to specifications. Fins are wide spaced to minimize dirt collection; housing is heavy gage sheet steel. Grinnell Co., Inc.

10—CLUTCH COUPLING

With taper bushing, is complete packaged unit, ready for use

Designed to accommodate any shaft from ¾ to 1¾ in. dia, (in ⅛ in. increments), with standard keys, the Rawson Clutch Coupling is adjustable on the job for various horsepower requirements. Coupling consists of motor section and driven section. The split taper bushing wedges the tapered coupling hub tightly to the shaft, to assure perfect fit.

Units are for use with motors from 0.43 hp at 580 rpm to 25.7 hp at 1800 rpm. Manufacturer says this coupling couples, cushions and limits the load and acts as a clutch. It is intended for use wherever a coupling is required to improve a motor drive. Centric Clutch Co.

11—METAL DETECTOR

Is electronic device for finding metal in non-metallic materials

This metal detector is designed to detect metal of any kind in rubber, limestone, lumber, textiles, coal. The equipment consists of detector or search coil, usually custom built to surround material flow in inspection area, and a water tight metal control cabinet, housing electronic and control relays, mounted within reasonable distance for connection to the search coil. Controls permit adjustment for detecting large or small pieces of metal or both.

In the detection of tramp metal the

A CLEAN Plant Is a SAFE Plant

TORNADO*

one-stroke, positive pick-up

Industrial

VACUUM CLEANER

The **TORNADO*** Method is the accepted, approved method of good "shopkeeping" and preventive maintenance. Reduces plant hazards.

TORNADO* is fast, thorough and efficient. Reduces labor and maintenance costs because one-stroke over the surface is all that is required. No need to waste time by restroking. Picks up wet and dry substances as they come—water, machine oil and other wet substances without machine adjustment. Leaves surface safe for workers. Increases morale. Eliminates health hazards

TORNADO* does all plant maintenance work with one machine. Motor unit removed in seconds to become a powerful, portable electric blower. Clean dry air blows out dust, dirt, grime and abrasive grit from interiors of motors, machinery and overhead equipment to reduce friction and hold break-down to a minimum. Equipped with tank, it becomes an efficient insecticide sprayer which shoots a fine mist to a distance of 50 feet. May be further converted into a compact, pack-carried vacuum cleaner for use in congested areas and other confined places.

Proved by over 16 years of industrial service to be the most practical cleaner for all plant maintenance. A clean plant is a safe plant.

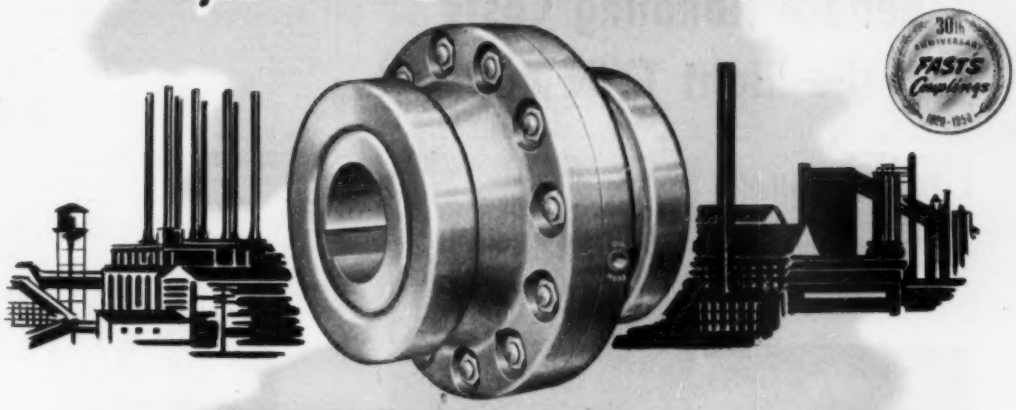
Bulletin 592 contains complete information. Write for it.

*Trade Mark Reg. U. S. Pat. Off.

BREUER ELECTRIC MFG. CO.

5086 Ravenswood Ave., Chicago 40, Ill.

NOW - you can FORGET COUPLING SHUTDOWNS—



INDUSTRY REPORTS—

KOPPERS ENGINEERING STOPS COSTLY FAILURES

In oil fields, steel mills, power plants . . . all through industry . . . cost-wise executives report that *Fast's Couplings*, designed, manufactured and guaranteed by Koppers, are the best insurance against coupling failures! Take a tip from these users who know. Specify Fast's and forget *your* coupling problems!

By specifying Fast's, you get the benefit of Koppers Engineering Service, acknowledged best in the industry. Koppers Engineers, backed by 30 years coupling experience, study your problem . . . then show you *which* Fast's Coupling fits your application, (and more important) *why* you need it!

Only Koppers can offer you this valuable service . . . only Koppers offers Fast's, the original gear-type coupling. Fast's Couplings assure you freedom from expensive coupling failures in your plant because Fast's have no perishable parts to fail!

GET THE FACTS: Mail coupon today for your free copy of the Fast's Coupling Catalog, published by Koppers. Shows how Fast's operate, describes the many sizes and types. Gives full details about Koppers Engineering Service. Send for your copy today.

These FAST'S COUPLING *Services save you money!*

UNSURPASSED ENGINEERING . . . *Koppers Engineers are acknowledged the best in the coupling industry. Their practical knowledge, backed by 30 years of coupling experience, is at your service!*

IMMEDIATE DELIVERY . . . *All standard types and sizes are available for immediate delivery from "on hand" stocks. In case of emergency, just wire factory for special rush delivery!*

LOWEST COST PER YEAR . . . *Fast's Couplings will outlast equipment they connect if properly maintained. Their cost may be spread out over 25 years or more, offering you lowest coupling cost per year!*

KOPPERS

FAST'S

THE ORIGINAL GEAR-TYPE

Couplings

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KOPPERS CO., INC., *Fast's Coupling Dept.*,
282 Scott Street, Baltimore 3, Md.

Please send me a free copy of your Fast's Coupling Catalog.

Name.....Title.....

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Address.....

City.....Zone.....State.....

Bothered by a lifting or conveying bottleneck?

Reduce Handling Costs With the Right TYPE of Hoist

1. Floor-controlled

with the operator primarily occupied with other duties. For quick, efficient handling of relatively "short hauls" without disturbing surrounding operations.

2. Cab-operated

operator in cab, traveling loads at speeds of 500 f.p.m. or more—and occupying the best vantage point for accurate spotting or stacking.

Floor-controlled? Cab-operated? Both are production boosters—but one is best for *your* job. We would like to work with you to determine the right type for your particular service.

We have given our complete attention to the manufacture of both types of hoists—and a complete line of overhead cranes—for a good many years. So we approach "through the air" handling with an open mind and a great deal of experience. May we show you pertinent data on installations similar to yours?

Shepard Niles

CRANE & HOIST CORPORATION

Makes and sells all three lifting tools for airborne shop loads

474 SCHUYLER AVENUE • MONTOUR FALLS, N. Y.

product to be inspected is conveyed by belt to the search coil where it enters an electro-magnetic field. If foreign metal is present the detector will automatically stop the belt, or operate mechanical, audible or visual signal devices.

The minimum size of metal particle detectable is generally dependent on size of search coil and material being handled. Unit operates on belt speeds up to 900 fpm and where magnetic separation cannot be obtained. Search coil and frame are adjustable in two dimensions to the particular conveying system. The detector is described as stable in operation, free from normal vibration effects, and automatic. Eriez Mfg. Co.

12—ELECTRIC CAPSTAN

For car pulling, barge moving; is built for one-man operation

Besides pulling and spotting cars, this capstan is recommended for towing trucks, bending pipe, dragging logs and moving skid loads. According to manufacturer, it can be used on the level, up grades and inclines, and around corners and curves.

Alloy steel capstan barrel is only moving

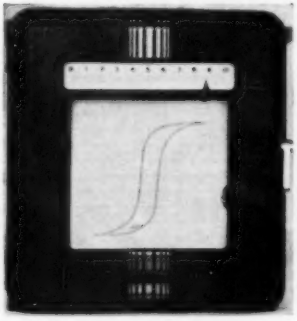
part exposed. Gearing is integral with motor and functions as one unit. Motor is squirrel cage hoist type available in 7½ hp for starting pull of 6000 lb, and 15 hp for starting pull of 12,000 lb. Entire gear mechanism is enclosed. Silent Hoist & Crane Co., Inc.

13—AUTOMATIC RECORDER

Plots X vs Y, showing one variable as function of the other

This new Speedomax Recorder is intended to eliminate compilation and manual plotting. Variables to be plotted are converted d-c signals, and connected to the instrument, one to the horizontal axis and the other to the vertical axis. The result is a permanent record, company explains, an accurate plotting in minutes of data that might otherwise require hours.

Pen travel (X axis) is controlled by company's Speedomax G electronic circuit. A similar circuit controls the chart paper



drive (Y axis) and makes it reversible. Thus, the recorder is engineered to draw curves, such as a hysteresis loop, temperature vs temperature difference, stress vs strain. Pen takes only 3 sec for full scale travel of 9⅞ in. Full chart travel is 10 in. and requires 4 sec. Standard minimum input voltage for full travel of the X coordinate requires a minimum of 10 mv for full travel. Leeds & Northrup Co.

Bulletins on Current Plant Problems

(Continued from page 28)

discussed in Bulletin 112. Process is explained and illustrated by diagrammatic sketch in color. Niagara Blower Co.

143 Cyclo Dust Collector—This bulletin explains and illustrates the working principle of an aerodynamic dust collector with filter surface consisting of slotted sheet bent into the form of a cone. Presents ten advantages of this filter. Also lists some of its other separating and filtering applications and includes photos of two installations. Aerodyne Development Corp.

144 Industrial Air Conditioning—Company's centrifugal humidifier, self-cleaning atomizer, unit air conditioning system and air washer systems are described briefly and illustrated in Bulletin 233. Emphasizes flexibility and economy of the equipment. Several installation photos show its use in various types of industrial plants. The Bahnson Co.

145 Aftercoolers—Technical Bulletin AG 447 explains the necessity for aftercoolers on compressed air systems and discusses the operation and construction of company's aftercoolers, illustrating their design by a sectional drawing in color. Includes layout drawings of typical installations, selection and dimension table and condensation chart. Bell & Gossett Co.

146 Self-Washing Filter—Engineering data, capacities, and weights covering company's self-washing air filters are presented in this bulletin. Explains operation of the filters and discusses their reduced maintenance, easy installation and other advantages. Farr Co.

147 Industrial Filters—Both a pressure leaf type filter for clarifying or polishing and a general service filter providing double filtration through layers of linen terry are clearly described and illustrated in this helpful 8-pp bulletin. Discusses each type as to its design, principle of operation, application and advantages. Illustrations cover photos of installations, cutaway drawings and piping layouts. The Blackburn Smith Mfg. Co., Inc.

TOOLS

148 Reversible Ratchet Wrenches—Bulletin F-12 is a data sheet on reversible ratchet wrenches for heavy duty use. Illustrates wrench, discusses its design and applications, and includes sizes and full ordering information. Greene, Tweed & Co.

149 Lathe Chuck—An improved lathe chuck engineered for tighter grip and greater range of performance is presented in Bulletin 48-LC. Accompanied by many photos, cut away illustrations and dimensional diagrams, the text covers design details and special advantages. Prices included. The Jacobs Manufacturing Co.

LIGHTING, COMMUNICATION

150 Industrial Lighting—Catalog AD5200 is a 48-pp quick-reference book describing and illustrating the most widely used of company's lighting units. Included are specifications and lighting data on a luminous louvered system for inconspicuous yet high level lighting, also detailed information on equipment for planned lighting installations for factories, including descriptions and specifications of units for outdoor lighting of yards, platforms and entrances, units for hazardous locations and units for lighting of work areas. Benjamin Electric Co.

151 Sound Powered Phones—The operating principle, special features and use of sound powered telephone equipment especially developed for mines, industries, public utilities, is discussed and illustrated by photos in illustrated Catalog 400-A. Stations and systems, headset and headset instruments are described and pictured. Wiring data and diagrams are provided, also specifications. United States Instrument Corp.

MAINTENANCE

152 Movable Scaffolds—How to put workers at job level safely, is the subject of Bulletin PEB-14 on section steel rolling scaffolds. It describes and illustrates a variety of arrangements of prefabricated steel sections in use as movable scaffolds for repairing, painting and other maintenance work. Typical installations are shown together with methods for assembling sectional units to adapt scaffolding to space, height and shape requirements of jobs. Text covers erection advantages and safety features. The Patent Scaffolding Co., Inc.

153 Industrial Ladders—The economy and safety advantages of good ladders are emphasized in Bulletin L-56 which illustrates and gives specifications for extension and single ladders, extra heavy duty and platform types, as well as safety ladder feet, extension trestles and other accessories. The Patent Scaffolding Co., Inc.

154 Portable Pressure Cleaner—A small, rugged cleaner for light duty, economical service is described and pictured in this bulletin. Discusses cleaner's convenience, flexibility and other features, explains operation, and includes specifications. Malsbury Mfg. Co.

SAFETY, SANITATION

155 Hand Driers—Form 1062 presents a quick-action hand and face drier for washrooms, describing and illustrating pedestal-recessed and wall mounted models. Includes testimonials from industrial and institutional users of the driers. The Chicago Hardware Foundry Co.

156 Fire Extinguishers—Twelve engineering design features which contribute to efficiency of company's dry chemical fire extinguishers for flammable liquid, gas and electrical fires, are stressed in this bulletin. Illustrated by photos of extinguisher and large cutaway drawing, also gives reduced prices now in effect. Ansul Chemical Co.

FLOORS, CEILINGS, DOORS

157 Floor Edge Insulations—Excellent engineering data on the structural insulation of concrete floors is provided in Bulletin ELSA4. Covers the properties of company's edge slab insulation, its usage, design calculations, and methods of installation. Generously illustrated with sketches and photos, the methods presented include both vertical and combined vertical and horizontal applications. Condensed specifications are included. Owens-Corning Fiberglas Corp.

158 Flat Slab Ceilings—A fast, beamless method of ceiling construction is explained and illustrated in this bulletin. Also discusses advantages and economy of the system and its basic design, and includes slab design tables and data on comparative strength of system's floors. Smooth Ceilings System.

159 Ceiling Construction—Eight-pp Bulletin 59 features a ceiling system which uses a steel grillage to eliminate flared column capitals, drop panels, and beams, and is credited with lowering construction costs. In addition to illustrating many factories, hospitals and other types of buildings now using this system, the booklet shows slabs with the results of various test loads. Smooth Ceilings System.

160 Rolling Doors—Specifications and dimensional and installation data on rolling service doors, fire doors, partitions, rolling grilles, are provided in 19-pp Catalog E-37. Also contains general description of these doors, explains their operation and discusses recommended uses. Cornell Iron Works, Inc.

ADHESIVES, SEALANTS

161 Multiple Purpose Adhesive—Hot, cold and reactivation bonding with a synthetic rubber resin solvent cement are described briefly in Form 1-F-38. Includes a short evaluation of the adhesive and properties of its dried film. The Flintkote Co.

162 Floor Sealer—A crystalline sealing substance which, when dissolved in water, can be used over new and old concrete floors is described in this illustrated folder. Discusses advantages of this sealer in preventing holes and ruts and dusting. Also gives instructions for applying it. Flexrock Co.

163 Sealant for Metal Fabrication—Test Report 55737 covers applications, use, and brief technical data on a sealant developed for the correction of surface flaws, faulty machining, and foundry gas holes. Includes prices. Also presents briefly an agent for bonding of similar and dissimilar materials. Western Sealant Inc.

164 Vinyl Butyral Resins—Technical Release 11 is a 22 pp study of company's vinyl butyral resins developed for adhesion to non-porous surfaces and now used in coatings of the wash primer type of metal conditioner and the wood knot sealer. Presents general properties of the resins, their compatibility, solubility, and discusses their applications in detail. Illustrated with charts, includes table showing compatibility of the "Vinylite" vinyl butyral resins with commercial resins, natural gums, waxes and oils. Bakelite Corp., Unit, Union Carbide and Carbon Corp.

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ACID HANDLING EQUIPMENT

165 **Acid Resistant Drain Lines**—Price List H-5 illustrates equipment for handling corrosive wastes from chemical laboratories and plants, plating rooms, steel mills and similar places. Covers new items and items of improved construction featuring company's high silicon drain line material for handling acids. Gives dimensions and ordering data on sink strainers and standing overflows, sinks, floor drains, centrifugal drum traps, pipe and fittings. The Duriron Co., Inc.

166 **Rubber Linings for Tanks**—Tables showing acids which can be safely and economically handled by rubber linings and which give storage tank dimensions ranging from those holding 225 to 30,000 gal are featured in Catalog Section 9000 on rubber linings and rubber-lined tanks. Describes and pictures company's process for locking rubber to metal, discusses materials used in various types of standard linings and recommends applications. Data on comparative costs of acid storage in rubber-lined equipment versus carboye is presented. The B. F. Goodrich Co.

POWER TOOLS

167 **Pipe Tool Ordering Guide**—Catalog 38, 32 pp, is company's recently revised ordering book covering the entire line of pipe tools, machines, power drives and threading oil. Products are illustrated by photos, some in color, and operational advantages are fully explained in the text. Ordering specifications are concise and clear. Catalog includes current price list, also names of prominent users of these tools. Beaver Pipe Tools, Inc.

168 **Breakers and Drivers** — Illustrated Bulletin H-1200-B40 presents seven models of paving breakers and sheeting drivers, telling the uses and advantages of each type and including specifications. Also contains photos of breakers in use. Worthington Pump and Machinery Corp.

169 **Power Tools**—Actually an ordering catalog, this broadside contains illustrations, details, capacities, specifications and current prices on more than 30 precision-engineered power tools, including three new band saws, a newly designed line of jointers, and improved table saws. Also pictures and describes drill presses, lathes, sanders, jig saws, shapers and accessories, pointing out improvements intended to provide easier operation, greater flexibility. Duro Metal Products Co.

SEPARATORS, FILTERS

170 **Steam Separators**—Bulletin S-14-C, presents line of separators for removing unwanted elements from steam, air and other vapors. It is profusely illustrated with photos, diagrams and line drawings, gives full specifications, selection and ordering data on company's helico-centrifugal separators of both vertical and horizontal types. The Sturtevant Co.

171 **Industrial Filters**—Here is a collection of bulletins covering company's line of filters for fuel and lubricating oil, water service, and compressed air, and providing illustrations of all types as well as specifications, service parts lists, instructions for use and prices. Also includes an interesting illustrated discussion of the manufacture of oil filters, describing in detail the woven wire cores and honeycomb cotton layers of the filter tubes. Commercial Filters Corp.

MISCELLANEOUS

172 **Welding Electrode Ordering Guide**—Here's a handy pocket-size booklet, Catalog MT-7, filled with information covering electrodes for hard surfacing and for welding stainless steels, alloy steels and mild steels. Includes operating characteristics, sizes, current ranges, tensile strengths, polarity. Brief text covers applications for each class of electrode. Harnischfeger Corp.

173 **For Better Seating**—Bulletin FF16 presents the advantages of posture seating from standpoints of good health and increased working efficiency. Contains full ordering data on company's line of aluminum posture chairs, emphasizing their adjustability to conform to physical proportions of users. Also stresses long-run economy promoted by reduced fatigue and higher efficiency credited to use of these chairs. Photos show available types and covering materials are illustrated in full color. Remington Rand, Inc.

174 **Packing Chart**—Bulletin P-30a is a handy application chart on self-lubricated packings. Intended to provide a ready answer to the "which packing where" question on more than 150 chemical services. Greene, Tweed & Co.

175 **Hardware for Metal Applications**—Fifty-pp Catalog K20d presents a line of locking, swinging and catching devices. Contains complete information on items listed, photos, dimensional drawings and keying operations. Among items presented is company's Tripelox line and other solid bronze, pin tumbler, key operated devices. Also covers utility locks, electric switch locks, cup and drop handles, hinges, flush ring catches. P. & F. Corbin Div., The American Hardware Corp.

176 **Pipe, Couplings, Joints**—Composite Catalog 39 illustrates and describes over 200 different ball-bearing swivel joints for temperatures from -20° F to 600° F, and pressures from vacuum to 10,000 psi in sizes ranging from ¾ in. to 12 in. Also carries data on company's steel rotary hose, metal marine and barge hose, steel calcasting and circulating hose, circulating heads and mud guns. Unions, blocks and thread compounds and low pressure gas burners and warehouse and derrick stores are also described and illustrated. Prices included. Chiksan Co.

177 **Chromium Chemicals Handbook**—This 32-pp book depicts use of chromium chemicals in more than 17 industries. Presents complete data on bichromate of soda, its manufacture and principle uses, including leather tanning, dry color production, and synthetic organic chemical processing. Also covers its utilization as a mordant for wool, as a "red dip" for brass and other copper-base alloys following annealing, and several anti-corrosive applications. Similar information is given for chromate and bichromate of potash, including six methods of analyzing sodium bichromate. Text is supplemented by charts and tables on equivalent weights, conversion formulae, tank capacities. Diamond Alkali Co.

178 **Diesels for Stationary Duty**—Diesel engines for stationary installations are described and illustrated in 36-pp Bulletin 4812. Touching briefly on company's 60-year history in engine research and production development, the book presents numerous recent installations of these engines in municipal, public utility and industrial power plants. Includes more than 100 engine specifications ranging in power from a naturally aspirated, six-cylinder 175 hp engine to a supercharged eight-cylinder 1500 hp engine. Superior Engine Div., The National Supply Co.

179 **Dual-Purpose Lubricating Device**—Bulletin 31 describes and illustrates a dual purpose unit—visible oil cup and visible oil gage—stressing advantages of more efficient oiling and easier checking of oil levels afforded by it. Includes dimensions and prices. Trico Fuse Mfg. Co.

180 **Water Softener**—High capacity water softening equipment utilizing the ion exchange principle is discussed in illustrated Bulletin 44, which emphasizes the advantages of the process. Explains design features of the unit and its multiple purpose valve. Deady Chemical Co.

181 **Industrial Clamps**—Bulletin 210-10 4 pp, titled, "Negator Clamps for Industry," discusses the principles, characteristics and applications for these new clamps. The first two sections, illustrated by engineering drawings, cover the clamps' automatic take-up, extendability, flexibility, constant pressure, coil form heads and long life. The section on applications is composed of photographs showing clamps in use in office and plant. Includes price list for standard stock sizes selected according to ASA recommendations. Hunter Spring Co.

182 **Walkways and Loading Racks**—A 36-pp data book filled with photos of installations and application suggestions. Part I, Section 6 of Catalog 54 presents pre-cut steel material for on-the-job erection into walkways, stairways, loading racks. Gives instructions covering the use of the units and includes layout diagrams and parts lists for the installations pictured. Block, Sivalls and Bryson, Inc.

183 **Glass Base Electrical Insulation**—Form EL-623-63 I is a buyer's guide listing names and localities of manufacturers, weavers and braiders, and distributors of Fiberglas-base electrical insulating materials. Owens-Corning Fiberglas Corp.

184 **Steam Hose**—specifications, application tips and construction details for three types of steam hose are provided in Form HY-8097-S. Includes photos showing construction of all three types, a brief discussion of hose for steam service and table giving temperatures of saturated steam and various gage pressures. New York Belting & Packing Co.

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14—ACCELERATOR

For speeding up automatic dispatching of elevator cars

These electronic tube devices transmit thousands of split-second impulses every hour directing and spacing elevators so they'll be where they're wanted and at the right time, company explains. They are incorporated in firm's Selectomatic Control System to make it an electronic dispatcher. An electronic timer automatically signals departure of cars from top or bottom terminal at regular intervals, it is stated, and this interval is varied with demand, between 20 and 40 sec.

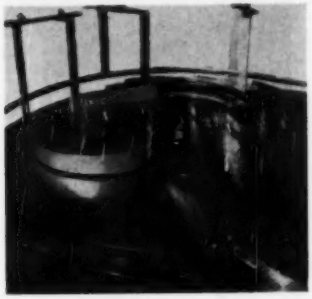
Heart of the timer is a vacuum tube that "fires" periodically and thus signals one car to start and another to get ready. An electronic counting device has been developed to insure adequate service for lower floors at a time when cars normally serving the lower floors are helping out in the upper floors. The system splits a bank of elevators into two groups, to serve upper and lower floors; but the control is designed to adjust automatically to varying traffic conditions.

Also applicable to automatic elevator systems is an electronic timer engineered to shut down an elevator's motor-generator set when no calls have been received for a specified period. It is credited with promoting considerable saving in power costs. Westinghouse Electric Corp.

15—UNSCRAMBLING TABLE

Has diverting mechanism for automatic discharge to conveyor

Now standard on all models of company's Styl-O-Matic Rotary Unscrambling Tables is a spring steel diverter designed to insure every unit being discharged to the conveyor. This diverter is said to permit a



case of bottles, jars or containers to be placed on the table, the carton lifted off and contents left on the table. Each item is then discharged in single file, without manual effort, company states. Table top is adjustable 32 to 38 in., with standard disc 36 in. Minimum floor space required is 24 in. square. Island Equipment Corp.

16—OVERHEAD DOOR

For paint spray rooms and areas subject to high powder content

This all-metal Rol-Top Door features rows of standard, furnace-type, spun-glass filters in each panel to permit a continuous supply of clean, fresh air to circulate into the room, even when door is closed. It is also intended to filter air escaping from the room.

It is reported that an exhaust fan at the opposite end of the paint-spray room keeps fresh air circulating constantly through the room. The use of baffles in front of the exhaust fan is said to do away with air turbulence and promote an even, draft-free exchange of air. Exhaust fans can be

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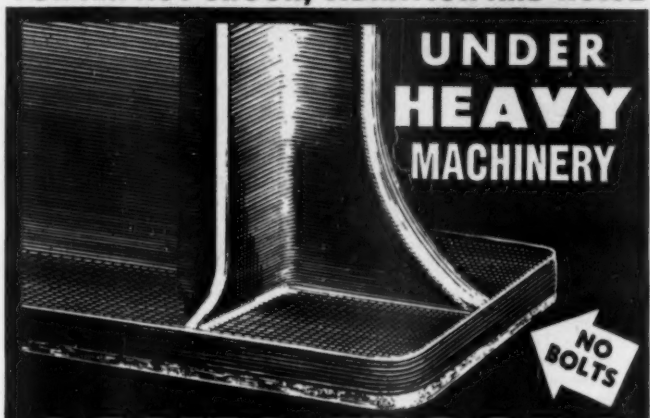

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arranged to turn on and off automatically as door is closed or opened.

Filters may be replaced, but original ones can be used indefinitely by dry washing them periodically with high pressure air hose, company points out. Door also has several glass panels for visibility. Available for manual or motor operation. Kinnear Mfg. Co.

17—FUNGICIDE SEALER

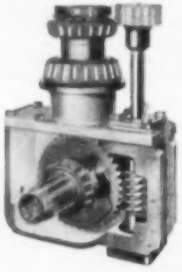
To moisture- and rot-proof oak flooring, other wood products

Tuf-On 630-F is adapted to production line finishing and said to dry in a few minutes and act as an impregnating agent. Penetrating the fibers of the wood this sealer reinforces and fungus-proofs at the same time, company explains, adding that 630-F is water resistant and brings out the texture of the wood grain. May also be used as a finish coat sealer, followed by multiple coats of varnish. Brooklyn Varnish Mfg. Co.

18—DIFFERENTIAL DRIVE

Is utilized in "walkie" type motorized hand lift trucks

The use of a true differential drive on company's HydroLectric Model K front wheel drive trucks is said to permit easy steering, reduce tire wear and promote maintenance economy. It is noted that even when truck is stopped, the wheels can be turned with the handle in vertical position—a help in close quarters.



Differential gear used is standard automobile drive. Wheels are driven independently for turning or steering, or at the same speed when going straight. According to manufacturer this is the only truck of its type with automotive type drive and sealed lubrication. Lift Trucks, Inc.

19—GRAVIMETRIC FEEDER

Is designed for accurate feeding of chlorine gas

The Model CGS Chlorinizer meters and feeds gaseous chlorine by the loss-in-weight principle. While particularly suited to very high capacities, it is said to be adaptable to exact low rate feeding. Chlorine cabinet and weight scale are separate units, interconnected only by small air piping. No chlorine is present at control station, it is claimed. Builders-Providence, Inc.

20—PENETRATING OIL

Has lubricant base with high capillary action for penetration

Not a solvent, 318 Pen-a-trate may be sprayed or dripped over parts to be loosened, or parts may be dipped or soaked. Blended with oils to obtain a minimum of surface resistance, 318 Pen-a-trate is said to utilize capillary action of lubricants to reach innermost points.

In motor repair work 318 Pen-a-trate applied through spark plug openings and allowed to stand helps remove carbon accumulations. It is pointed out, and a few drops applied to cylinder head bolts permits easy removal. A blend of high flash, low surface tension oils in 318 Pen-a-trate is intended to permit application of moderate torch heat without sudden flash or explosion. It is available in 5, 15, 30 and 55 gal drums. Ensign Products Co.

21—TANK FLANGE

For use with cutter for connecting pipe to tank quickly

The Unitank Flange body, tapped both ends and threaded outside, is inserted through a hole from the inside of the tank. The tightening nut, which has one face flanged out and finished, is the outside

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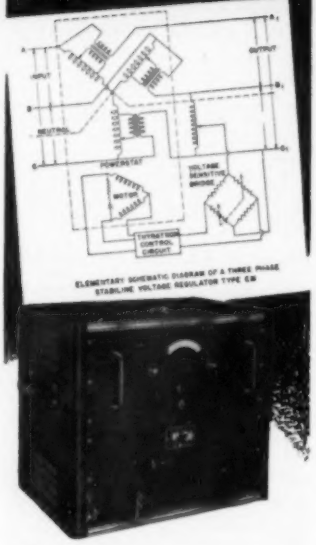

ELEMENTARY SCHEMATIC DIAGRAM OF A THREE PHASE STABILINE VOLTAGE REGULATOR TYPE EB

USE STABILINE ELECTROMECHANICAL VOLTAGE REGULATORS

In the plant — as in the laboratory — constant voltage is a necessity. It can be maintained to large industrial loads by using STABILINE (Electromechanical) Automatic Voltage Regulators.

These units feature zero waveform distortion; complete insensitivity to magnitude and power factor of load; no effect on system power factor; no critical adjustments; high efficiency; adjustable output voltage. Available for a wide range of applications in 115, 208, 230, 440 volt, single and three phase ratings; capacities to 100 KVA.

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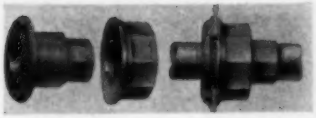

piece and is attached by a left-handed thread. Thus tightening a pipe in the flange tends to tighten flange in the tank. It is pointed out. Only gasket used is placed on flange body against the collar on the inside of the tank. Since it is not in contact with the flow, it cannot blow out, company states.

Because body is threaded inside both ends, pipes can be attached to the one fitting inside and outside the tank. Flange has a tensile strength in excess of 50,000 lb, it is reported, and comes in six pipe sizes from ½ in. to 6 in.

The Unitank Flange Cutter, which operates on a combination punching and shearing can-opener principle, is said to cut any thickness of steel up to ¼ in. (or 7 gage). Guide and backing plates are provided for each size of flange from 2 to 6 in. Smaller cutters available for smaller flanges. American Pipe and Steel Corp.

22—SELF LOCKING HEX NUT

Has locking insert to prevent rotation and assure tight grip

In addition to being designed for firm gripping, the locking insert in the Tuflock Nut is chemically treated to resist both absorption of moisture and drying out. Nut body is cold forged for extra strength and said to give performance in excess of Army-Navy requirements. Available in sizes 4 through ⅜ in. The Townsend Co.

23—IMMERSION HEATER

Is screw-plug type for heating chemical and oil solutions

This thermostatically controlled unit is suggested for heating tar, parrafin, asphalt, solvents and other viscous and corrosive liquids. It has ½ in. dia hairpin tubular elements welded or silver-solvered into a standard screw-plug for easy mounting in pipes and tanks. Heaters have either copper heating elements with a brass screw-plug, or steel elements and screw-plug.

Built-in thermostat has temperature range of 60 to 250 F for water type solutions, or 200 to 550 F for viscous compounds. Temperature is controlled by adjustment knob on outside of sheet-steel thermostat housing. The bulb is encased in protective well on screw-plug. Heaters are rated from 1.5 to 10 kw for 115 to 230 v operation, single or three-phase. For use in hazardous locations the terminal assembly can be housed in a moisture-resistant or explosion-resistant terminal cover. Edwin L. Weigand Co.

24—THICKNESS GAGE

For measuring cold rolled steel strips from 0.0050 to 0.1196 in.

This X-ray gage is designed to measure in steps of 0.0001 in. It compares the amount of X-ray absorption from two X-ray beams identical in intensity, one through a sample of steel of the exact thickness to be rolled and the other through the steel strip being rolled. Results are interpreted visually.

Electrical and radiation protection are provided to safeguard personnel, company points out, and mechanical protection is

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CHAIN DRIVE SPELLS TRUCK FAILURE . . .

that's why Stuebing engineered true differential drive into HydroLectric K Lift Trucks.

● Check maintenance records on your truck fleets. You'll find drive failures account for the greatest percentage of repair costs and down time. Old-style chain drives just can't take it!

True differential gear drive, the same as in your auto, eliminates chains in the Hydro*Lectric* K . . . outwears chain drives ten to one according to fleet owner reports. All gears and running parts are sealed in lubricant for longer life.

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How to guard machinery

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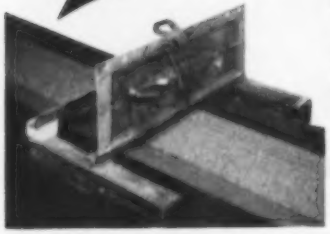

Above. Look at the iron on this inexpensive Dings PERMA-PLATE Magnet! It protects a set of $7,000 rolls. Bulletin on request.

Below. The PERMA-PULLEY for fully automatic iron-removal. Non-electric, no maintenance. Ask for Bulletin.

Protect crushers, grinders, pulverizers, stokers, screens, rolls, knives, pumps against tramp iron . . .

CHANCES are the cotton in your mattress passed over a Dings Magnetic Separator to remove stray iron that would otherwise wreck the bedding manufacturer's garnett rolls . . . your power company protects its coal pulverizers with these magnetic guardians to assure you 24-hour a day service.

Is your plant equipment as well protected? You can *guard* it *forever* against damage and downtime due to tramp iron with Dings new Alnico magnetic Perma-Pulleys and Perma-Plate Magnets . . . their magnetic permanence is *guaranteed for the mechanical life of the installation.*

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4766 W. Electric Ave., Milwaukee 14, Wis.

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Certified
MAGNETIC STRENGTH

provided to minimize damage to transformer, X-ray tubes, pick-up unit and sample systems in event of a cobble or a mill wreck. Equipment is sealed to keep out dust and moisture. Westinghouse Electric Corp.

25—LOAD SELECTOR

For estimating beam and column loads; works like slide rule

The Unistrut Beam Load Selector is pocket size and designed to show the amount of weight which can be supported by company's various Unistrut sections, under varying conditions of span and unbraced weight. Conversely, it shows combinations of sections required to support a given load. The selector is of unusual value in figuring materials handling, maintenance, plumbing, heating and ventilating jobs. Offered without charge to qualified plant engineers. Unistrut Products Co.

26—SOLENOID VALVES

Double type, for pressures to 125 psi, in ¼, ⅜, ½, ¾ in. sizes

All sizes of these double solenoid valves are available for 110, 220 and 440 v in both 50-60 cycle and 25 cycle current. Valve has a one-piece bronze base for each solenoid, heavy solenoids, heavy sheet metal cover, "OU" type packer and shock-resisting clevis and pin. Valves come in two-way, three-way piped exhaust, and four-way piped exhaust. Valvair Corp.

27—CRANE BLOCK

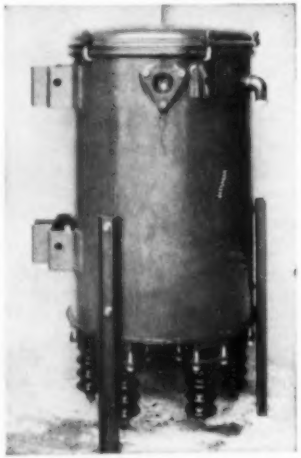
Low head type, in capacities from 10 to 50 t for all hook work

The Lo-Head Crane Block, with shorter overall length, is designed to permit 1½ to 2 ft higher lifts without lengthening the boom. The forged hook operates on Timkin tapered roller bearings and the cast steel sheaves are equipped with Hyatt Hi-Load bearings. Lubrication is said to be needed only once each 2000 hr. Alemite fittings are provided for standard grease gun use. American Hoist and Derrick Co.

28—CAPACITOR SWITCH

Is oil-immersed, electrically operated, built for outdoor use

Rated at 15,000 v, 100 amp continuous, three-phase, the B-1 Capacitor Switch is



PIPE MARKERS

QUIK-LABEL Pipe Markers conform to American Standards Association Pipe Identification System. QUIK-LABELS come on handy cards . . stick without moistening. Names of materials printed in large black letters on correct ASA background colors. CAN BE READ UP TO 75 FEET. Markers for over 140 materials, **including all materials listed in ASA Standard A13,** available on Brady Stock Cards. Specials made to your order. QUIK-LABEL Pipe Markers are Silicone Plastic coated to resist dirt, grease, fumes, moisture . . . indoors or out. Replace slow and costly painting and hand stenciling. Exclusive Starter-Strip automatically releases part of label for fast peeling. QUIK-LABELS mark your pipes so that anyone who can read will know what's in them. **QUIK-LABELS leave no room for doubt . . . or tragedy.** Write for useful literature and FREE SAMPLES today.

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PE 2-50

designed to enable users to supply additional kilovars economically by means of capacitors instead of more expensive switching devices. According to company engineers, the new switch is intended to encourage capacitor installations on high voltage circuits. Primarily meant for pole mounting, it can be supplied as a component part of housed capacitor equipments if desired. It is capable of switching its continuous current (100 amp) at 15,000 v. Transformer and Allied Products Divs., General Electric Co.

29—THERMOMETER

Is flat-stemmed, magnetic type, available in nine ranges

The temperature of transformers, engine blocks, air ducts, exhaust ports and like surfaces can be checked with this device, manufacturer points out, because it covers heat area like a blanket, gathering and retaining heat from the surface under test. The magnets are provided to enable operator to place the thermometer on a flat surface and "peel" it off quickly.

Made of stainless steel, thermometer is said to withstand 3476 psi pressure. Available in five Fahrenheit and four Centigrade ranges, the former from 0 to 200 F to 200 to 1000 F. Comes with stem lengths ranging from 3 to 42 in. and four dial sizes from 1 to 5 in. W. C. Dillon & Co., Inc.

30—CONNECTOR FITTING

For use with armored cable or non-metallic sheathed cable

This is company's redesigned 1914A fitting for entering the back of the Model 1900 Plugmold multi-outlet system; it was formerly equipped with an armored cable connector. Company points out that when the new dual-purpose type is used with non-metallic sheathed cable, grounding may be obtained by wrapping the ground wire around clamping screw. Fitting is 6 in. long with a 4 in. cover section. Two couplings are furnished. The Wiremold Co.

31—CONTROL CENTERS

Contain motor starter units for centralized group machine control

Starter units used in these standardized control centers feature plug-in type disconnects on the line side for safety. They are 20 in. wide by 20 in. deep with heights in multiples of 14 in. for interchangeability in standard indoor structures either 78 or 90½ in. Unit can be mounted back to back to save space.

Starter units can be locked in a positive tilt-out position, disconnected from the

line. Self-connecting bus connectors automatically connect line terminals when starters are inserted, it is pointed out. Individual starter units are baffled from each other for added safety, and provision is made to vent hot ionized gases created by short circuits. Starter unit right hand baffles and spacer bars can be removed to give a full-length vertical wiring trough. Units are front connected and wired. If they are removed, door can be fastened shut. Westinghouse Electric Corp.

32—FORK LIFT TRUCK

For transferring heavy loads to and from balcony storage areas

The Elevator Fork Lift Truck is engineered to handle loads up to 2000-lb between balcony and first-floor production areas. It has a specially designed non-tilt mast and carriage assembly to permit the load carrying forks to be lowered 98 in. below bal-

Speer carbon brushes are especially designed to withstand the exacting demands of electric hoist motors. This means the ability to meet the high starting torque and frequent reversals necessary for full load performance.

By matching brushes to service characteristics, Speer has provided during the past 50 years, a complete line of brushes to meet all motor and generator requirements. Complete experimental and testing facilities are available for analyzing your brush requirements for machine designs or maintenance problems.

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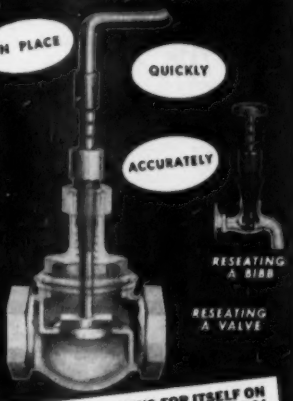
IN PLACE · QUICKLY · ACCURATELY



PAYS FOR ITSELF ON FIRST 2 OR 3 JOBS!
Don't junk expensive globe or angle valves, bibbs, fixtures—reseat them! Order Skinner Valve and Bibb Reseater. Easy to use. Guaranteed cutters leave seat glass-smooth, level, tight.
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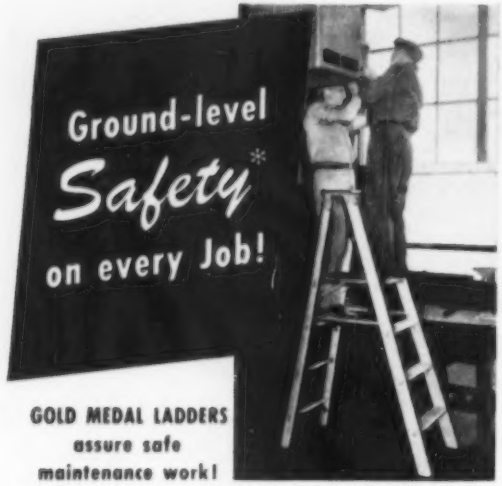

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In ladders, it's practical economy to buy the best . . . and that means the safest, the strongest and the best suited to service and maintenance work. GOLD MEDAL Ladders satisfy all conditions. There's a size and type for every need—keep your men at the right working height safely. In design, materials, convenience, construction and safety, GOLD MEDAL Ladders are unexcelled. *They're designed and built for lasting service.* Use them to cut your accident rate and eliminate costly lost time.

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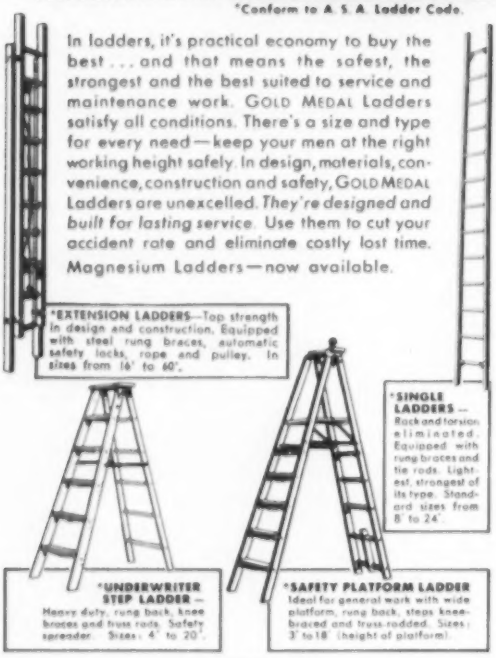

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***UNDERWRITER STEP LADDER**—Heavy duty, rung back, knee braces and truss rods. Safety spreader. Sizes: 4' to 20'.

***SAFETY PLATFORM LADDER** Ideal for general work with wide platform, rung back, steps knee-braced and truss-rodded. Sizes: 3' to 18' (height of platform).

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cony floor level. Mounted on company's Model LT-40 fork lift truck, this elevating unit can lift or lower full capacity loads between first floor and 10 in. above balcony floor level. Outside width of carriage is 21 in. Can be built in other capacities and heights of lift. Towmotor Corp.

33—METAL TESTER

Is portable electronic instrument for locating defects

The Type UR Reflectoscope replaces company's former model. Modifications include an improved pattern of square-wave "inch markers" on the horizontal axis of the screen to facilitate interpretation of test results. Also a control is provided to give

operator additional control of sensitivity by reflecting indications of small defects which do not affect performance of material under test.

The instrument is used for testing steel billets, forgings, castings, finished stock and a wide variety of machined parts. Welds in steel plate, pipes and containers are tested by means of an angle-beam technique. Sperry Products, Inc.

34—HARDNESS TEST

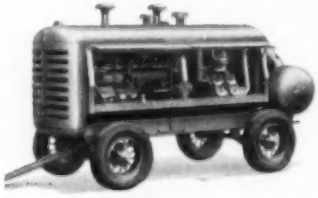
For water analysis, is simplified titration method

This new hardness test for water is described as more accurate than other methods and considerably more rapid. Because of its simplicity it is said to insure accurate results when run by non-skilled personnel. Test invloves use of color indicator, buffer reagent and hardness titration solution. Complete test set, including apparatus and chemicals, is $18.00; refills of solutions may be obtained separately. W. H. & L. D. Betz.

35—AIR COMPRESSOR

Is Diesel-driven portable unit of 500 cfm capacity

The engine of the IKA 500 Mobil-Air is the International Harvester heavy-duty UD-24, built to start easily as a low-compression gasoline-engine and after a short warmup period be shifted to full Diesel operation by a single lever. Company's Floating



Speed Regulator slows down compressor to lowest practical working speed that compresses just enough air to hold the pressure. This is said to result in greater fuel saving and higher average air pressure. Full 500 cfm capacity is delivered at 100 psi pressure, company states. Ingersoll-Rand Co.

36—DRAWING BOARD

Has "air cell" construction for lightness and strength

Described as easy to use, carry and handle, the Featherweight Drawing Board is said to be extremely light because of its honeycomb or air cell construction. Of plywood, its combination of top and bottom panels, framework and honeycomb with wood grain running in different directions, is designed to provide exceptional strength. All elements are bonded into a permanent unit with waterproof glue and the entire board dipped in a waterproofing agent to seal in and preserve the honeycomb construction.

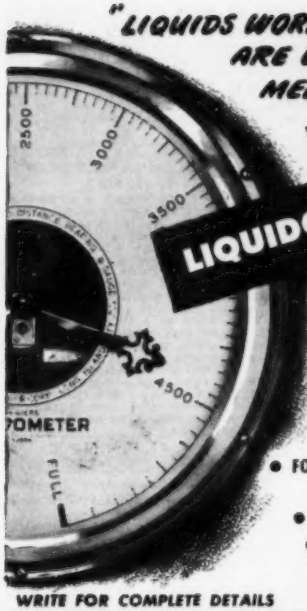
Board is made in sizes from 12 by 17 in. to 31 by 42 in. Optional extra features are a straight-edge gear rack aligner; transparent plastic removable straight edges, and water-resistant vinyl-coated fabric carrying case. Cal-Pan Corp.

37—PIPE WRENCH

Made of aluminum alloy is lightweight, durable

Drop forged from high tensile alumnium alloy, heat treated for strength and toughness, this wrench is said to have strength

"LIQUIDS WORTH STORING ARE WORTH MEASURING" with a



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Repair CRACKED CONCRETE FLOORS

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QUICK FLOOR PATCH CEMENT

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Which Garlock rod packing is braided through and through for longer life?

ANSWER:

LATTICE-BRAID

In GARLOCK LATTICE-BRAID *every braiding strand* passes diagonally *through* the body of the packing at an angle of approximately 45°. All the strands are strongly lattice-linked together into a structural unit which holds together even when the packing is worn far beyond the limits of wear of ordinary braided packings.

LATTICE-BRAID packing is manufactured of asbestos, flax or cotton for various types of service. Write for descriptive folder.

The unique structural design of LATTICE-BRAID packing gives it great strength, long life and unusual flexibility.

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GARLOCK

PACKINGS, GASKETS AND OIL SEALS

and durability comparable with heavy wrenches. Replaceable alloy steel inserts are interchangeable. They are cadmium plated, as is steel adjusting nut. Natural satin finish. J. H. Williams & Co.

38—COPPER PASTE

For fast, economical assembly of parts for furnace copper brazing

Cubond is copper in paste form. Its manufacturer is also introducing an applicator gun for extruding it in rounds or ribbons. For pneumatic or hand use, the pneumatic type gun can be set for automatic operation and actuated by foot pedals, cams or electrical controls. Pastes come in two general types; one with a synthetic petroleum base and the other with a base that does not change viscosity with changes in temperature.

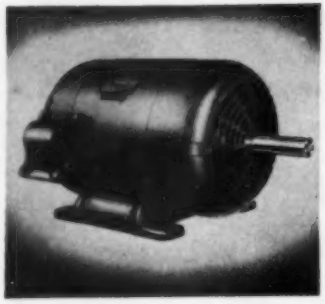
The petroleum base pastes can be extruded without thinning, but may be thinned for use with brush, spray or dip. They thin slightly with temperature rise and are considered ideal for applications where copper is placed in one spot and carried to other areas by vehicle fluidity. These pastes won't settle or harden in the can or on the job, it is said, and may be thinned with kerosene or light fuel oil without settling. There is claimed to be no chemical reaction between copper source and vehicle and a bright clean part surface results.

The non-petroleum pastes are heavy and do not thin with temperature rise; they may be thinned with water or permanent-type antifreeze. Metals Refining Co. Div., The Glidden Co.

39—ENCLOSED MOTORS

Are squirrel-cage, explosion-proof type, built of heavy steel

A special primer, thermoset varnish and nitrocellulose base finish are used on these Life Line Motors intended for use where Class I Group D explosive materials or atmospheres are encountered. They have prelubricated ball bearings. Designed for constant speed drive applications, such as pumps, blowers, or compressors, they are available in frames 224 to 326, in 1 to 20 hp ratings; for two and three phase; 25, 50 and 60 cycle, 220, 440, 550 v service. Westinghouse Electric Corp.



40—SMALL HP CLUTCHES

For fractional and low unit motor and engine applications

A special feature claimed for these new Rawson Clutches is adjustability by the user on the job, for a wide range of capacities. The same clutch, it is claimed, can be used with motor or engine for capacities from a fraction to a low unit horsepower, by adjustments of the friction segments, called shoes, and of the springs. Besides adjustments for capacity, the pulley type clutches are said to accommodate several standard sizes of pulleys. The Centric Clutch Co.

41—ELECTRIC DEODORIZER

Works to kill unpleasant odors and leave atmosphere fresh

The Odor-Ban Deodorizer is a small bakelite unit weighing 1½ oz. Deodorant O-B Cakes are inserted in the deodorizer and activated by the heat of electricity when the unit is plugged into a wall socket, the activated air being expelled through the top grille. A cake is expected to remain effective for 100 continuous hr, or four days, and may be removed from the Odor Ban when not in use and stored in its jar. Unit uses less than 4 w of electricity. Retail prices are $1.25 for the deodorizer, or $15.00 per doz. Individual cakes cost $2.50 ea.; by the dozen, $2.40 ea.; by the gross, $2.25. Cauhorn Distributing Co.

42—LOAD LIMIT SWITCH

May be applied to any wire cable from ¼ to ¾ in. dia

The Cable Load Limit Switch is an instrument for operating an electric switch when cable tension reaches a predetermined value and may be applied without cutting or removing cable. An alloy steel rectangular beam is clamped on cable, and an offset placed in the cable to deflect the beam so loading will operate switch. An adjusting screw is provided to set the switch and an auxiliary stud to seal the switch when used as a limiting device.

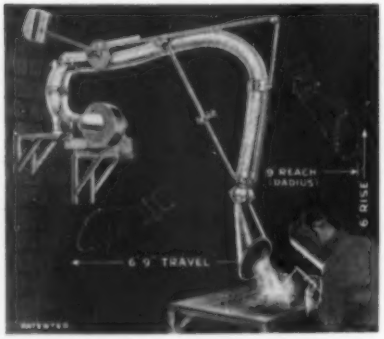
Switch can be used with closed contacts connected in series with a holding coil of the hoist magnetic starter; or the open contacts can be connected to close an alarm circuit when load limit is reached. Load setting can be any value from 500 to 25,000 lb single-line pull, which can be set either at the factory or at the plant. Martin-Decker Corp.

43—GAS-FIRED INCINERATOR

Has 20 bu combustion chamber lined with fireproof Haydite slabs

The Winnen CB-20 Incinerator, recommended for factories, institutions and commercial buildings, is built of heavy-gage bonderized steel and shipped knocked down for erection on the site. Manufacturer says unit consumes 400 lb of 50 per cent moisture content garbage or trash per hr.

A twin-burner mechanism provides a hot flame with natural, manufactured or bottled gas. A forced-draft ventilating system, powered by a ½ hp electric motor and squirrel cage blower fan is used to insure dehydration and combustion of refuse and eliminate smoke and odor inside



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Why continue to let your employees inhale welding fumes? You can solve the problem quickly and efficiently by installing a Ruemelin Fume Collector. It produces a powerful suction that draws out noxious gases, smoke and heat at the source. Guards employee health, resulting in less welder fatigue, therefore, greater plant output. Clears shop air with minimum loss of building heat. Covers maximum welding area vertically, horizontally and by circle swing. Shipped assembled, easy to install. 9 ft. and 15 ft. sizes (radius of swing).

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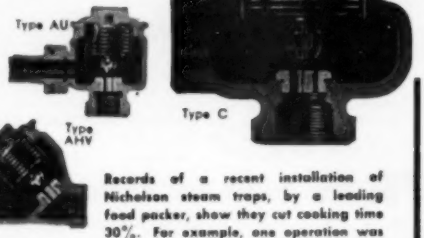
Nicholson Steam Traps

CUT Processing Time 30%

for Food Packer



Records of a recent installation of Nicholson steam traps, by a leading food packer, show they cut cooking time 30%. For example, one operation was shortened from 45 to 45 minutes. Nicholson units keep equipment full of live steam because: 1) they operate on lowest temperature differential; 2) have 2 to 6 times average drainage capacity. Also widely specified for preventing damage to thin gauges; eliminate cold blow in unit heaters; record low for steam waste; and maximum air-venting capacity. 5 types for every application; size ¼" to 2"; press. to 225 lbs.

BULLETIN 1047.

W. H. NICHOLSON & CO. 308 Oregon St. Wilkes-Barre, Pa.

Valves • Traps • Steam Specialties

Outlast Ordinary Faucet Washers 5 to 1

You can stop costly faucet leaks that boost water, fuel and labor costs and ruin expensive fixtures. Insist on pat'd "EASY-TITE" Faucet Washers—made of DUPONT NEOPRENE to withstand absorption and extreme high temperatures (upwards of 300° F). Fabric reinforced like a tire, "EASY-TITES" can't split or mush out of shape. Outlasting ordinary washers 6-to-1, "EASY-TITES" have cut faucet repairs to a minimum and brought maintenance costs sharply down in plants, hospitals, schools, hotels and institutions everywhere.

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Lists over 2,300 'SEXAUER' Triple Wear Replacement Parts and pat'd Precision Tools as advertised in the SATURDAY EVENING POST. Standard with leading maintenance engineers everywhere. Send a postcard for your free copy TODAY.

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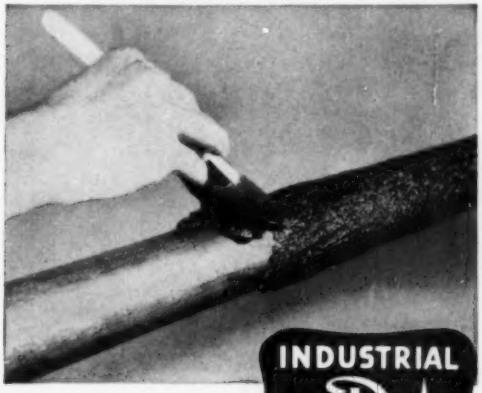
World's leading specialists in plumbing and heating maintenance.



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COVER PIPES, TANKS WALLS

Anyone can brush, trowel or spray NoDrip on any clean, dry surface. Goes on like plaster, forms a seamless, protective coating, *stops condensation drip.* NoDrip keeps equipment and floors safe and dry; prevents corrosion of metal and prolongs its life. Acid, alkali and brine resistant. Comes in 1, 5 and 55 gal. drums, ready for use.

TRY NoDRIP

Apply NoDrip to a small area, compare the results with uncovered portion.

Send for free NoDrip Handbook

J. W. MORTELL CO.
537 BIRCH STREET KANKAKEE, ILL.

Yes, the EVERLASTING is a valve that actually *improves* with use. This is because of its unique design, in which the disc is always in contact with the sealing surface of the seat. Each time the valve is opened or closed, the disc moves across the sealing surface with a rotating motion, thus lapping one to the other. This self-lapping movement continuously polishes the sealing faces, which helps to perpetuate the drop-tight seal.

EVERLASTING Valves have additional superior features, too. Their straight-through flow minimizes pressure loss, they require no lubrication, and they can be opened or closed with less than a quarter turn of the operating lever. For more than 40 years, these unique valves have proven to be the best for blow-off, shut-off, equipment outlets, and many other services; and they are suitable for acids, alkalis, viscous materials and process liquids as well as for steam, water, air and gas.

Write for bulletin today.

EVERLASTING VALVE CO.

49 Fisk Street, Jersey City 5, N. J.

Trade Mark "EVERLASTING" Reg. U. S. Pat. Off.

Everlasting Valves

for everlasting protection

building. Ashes are removed through door.

For continuous or intermittent operation, the incinerator is lighted with either a manually operated or continuous pilot flame. Fuel costs are said to be low. Unit is 84 in. high, 41 in. wide, 41 in. long. Ramsey-Bennett Co.

44—ELECTRIFIED HONE

Utilizes magnetic honing action to sharpen knife blades, tools

This sharpener won't burn blades or grind them away, manufacturer says, explaining that to operate the device you simply plug it into a 110-120 v a-c outlet, press the starter button and hone—both hands are free to hold object. Sharpener rests on flat surface and is 6 by 7 in. in size, 5 in. high. Complete with cord, plug, three interchangeable honing stones (one convex, two flat), it costs $10.50. Synchro Corp.

45—PULL SWITCH

Is extra thin for installation where switch space is limited

Only ¾ in. thick, the Model 71 is recommended for shallow fixtures and canopies and fractional horsepower motor controls. It is a 6 amp, 125 v switch with Levolier type mechanism and lever control and carries an Underwriters' Laboratories "T" rating, company states. Housing is molded phenolic plastic, 1⅞ in. wide and 1⅝ in. long. Six-in. wire leads are fastened to terminals by pressure connections and each switch has a lever and pull chain and 6-ft cord and bell. McGill Mfg. Co.

46—AUTOMATIC DEGASSER

For use in conductivity measurements to determine steam purity

This device is engineered to produce continuously and automatically an approximate 50-50 split of a flowing steam sample—one fraction containing any dissolved solids that may be present, and the other any dissolved gases. The sample containing the solids is run through a cell in which its electrical conductivity is measured to provide an indication of steam purity.

Flowing steam and condensate contact only stainless steel in this unit, it is pointed out, so contaminating materials are not picked up. Time interval from flow cell is about 1 min. This means that operator can correlate recorder charts made in conjunction with the degasser with other operating charts, company explains.

A second cell is provided to measure conductivity of the gas fraction. Both fractions can be diverted for chemical analysis. Hagan Corp.

47—A-C MOTOR STARTERS

Conform to latest NEMA standards for industrial control

Standardized wiring and mounting dimensions have been adopted in this line of a-c magnetic starters and contactors to simplify engineering, installation, and maintenance of machine controls. Sizes 0, 1, and 2 open-type have holding circuit interlocks located to left of vertical centerline.

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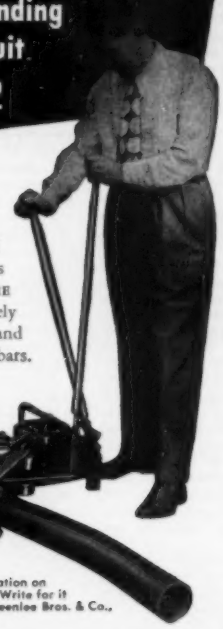

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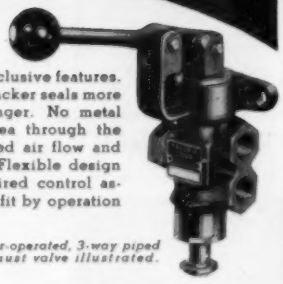

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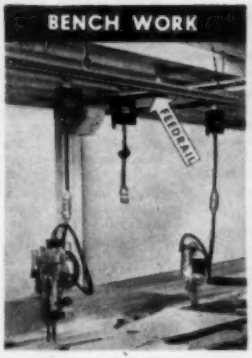

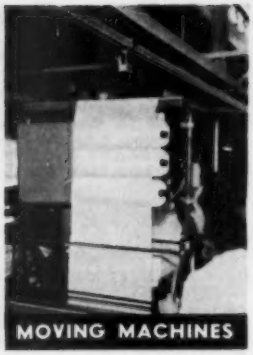

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New Books for Plant Engineers

An asterisk (*) following the title of any book described in this department indicates that the book may be purchased from the Book Department, PLANT ENGINEERING, 53 W. Jackson Blvd., Chicago 4, Ill.

Metals, Surfaces and their Cleaning

A.S.T.M. METAL CLEANING BIBLIOGRAPHICAL ABSTRACTS (1893-1949) prepared by Jay C. Harris. Size 6 by 9 in.; 72 pp; paper bound. Published as Special Technical Publication No. 90 by the American Society for Testing Materials, 1916 Race Street, Philadelphia 3, Pa. Price $2.75.

THIS BOOK makes available in compact form a tremendous amount of information on the subject which should be of widespread interest to all engineers concerned with metals and their surfaces and cleaning.

The references are arranged first by year and then by author, and they are numbered consecutively with specific numbering sequence. There are almost 500 references and abstracts.

This book should prove very helpful to engineers for easy reference purposes and suggestions on metal problems.

Solution to Your Pipe Joint Problems*

METHODS OF JOINING PIPE by J. E. York. Size 5½ by 8½ in.; 236 pp; cloth bound. Published by The Industrial Press. Price $3.00.

PIPING SYSTEMS can present quite a problem when such factors as the following confront a company: selection of pipe material, temperature and pressure conditions, pipe size and pipe location, labor available for making the joints and for servicing after the line is installed, installation and maintenance costs, and ability to repair the joint without shutting down the system.

The proper selection of pipe joints, based on an intelligent consideration of these factors, is effectively and comprehensively covered in this book. The book illustrates and describes all types of pipe joints, including expansion joints.

The text covers such material as: screwed joints for ferrous and brass pipe; flanged pipe joints; welded and brazed pipe joints; methods of joining cast iron pipe; joints for thin wall tubes; joints for plumbing and chemical-resistant pipe, joints for vitreous tile and concrete pipe; joints for transite pipe; joints for wood pipe; and joints to permit movement. Included also are data on gasket material and applications.

This is a valuable reference book for every engineer concerned with piping problems and selection of materials and methods.

Planning is Know-How*

CHALLENGE OF THE AMERICAN KNOW-HOW by Pearl Franklin Clark. Size 5¼ by 8 in.; 172 pp;. cloth binding. Published by Harper & Bros. Price $2.50.

THE AUTHOR, wife of the famous management engineer, Wallace Clark, tells how she and Mr. Clark studied, at close range the operation of European industrial methods and how they were able to measure carefully the peculiar habits of mind that make it so difficult for Europeans to grasp and apply American managerial and production methods.

The story illuminates the weakness of European industry in dealing with the human problems of management. The author states that in Europe they think there is some magic method by which you can put into operation all the machinery and procedures used in American factories and then sit back in the front office and watch them work miracles.

She shows how this definitely is not the case; for the real secret of the American know-how is in planning from the bottom up. That is, when obstacles occur in the free flow of work, the American engineer immediately goes right to the work and whenever necessary, if the trouble is not obvious, begins to question the worker himself and try to get his ideas on what is causing the trouble.

Engineers know that when this type of American planning and management is done, as Mrs. Clark describes it,

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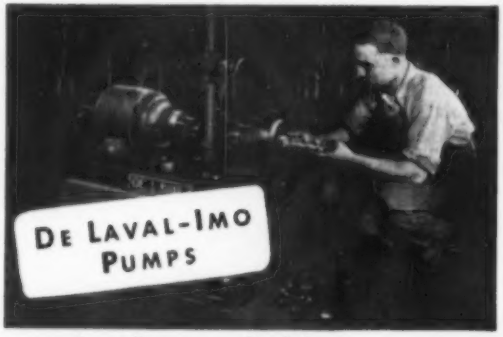

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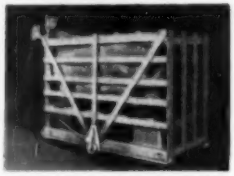

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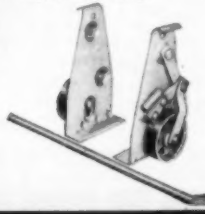

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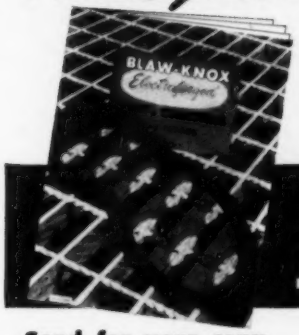

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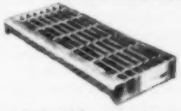

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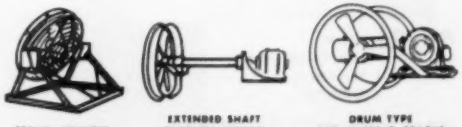

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(Continued from page 74)

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For Engineers, Architects and Heating Contractors*

HEATING, VENTILATING, AND AIR-CONDITIONING FUNDAMENTALS by William H. Severns and Julian R. Fellows. Size 6 by 9¼ in.; 666 pp including index; ill.; second edition; cloth bound. Published by John Wiley & Sons., Inc. Price $6.50.

THIS BOOK is intended for engineers, architects and heating contractors, as well as for students of architecture and architectural and mechanical engineering.

Along with the applicable theory, the accepted commercial practices are given. Examples of typical calculations have been included where they add clarity to the treatment. Representative commercial equipment has been illustrated and described — sufficient data are given also to permit the reader to do some practice work.

The contents cover such subjects as: psychrometric properties of air; factors affecting human comfort; heat transmission and heat losses from buildings; heating boilers and appurtenances; pipe, tubing, fittings, coverings, and piping details; panel heating; mechanical refrigeration; automatic controls—pressure, temperature, and humidity.

Basic Diesel Data*

ELEMENTS OF DIESEL ENGINEERING by Orville L. Adams, Sr. Size 5½ by 8 in.; 367 pp; illustrated, cloth binding; second edition. Published by The Norman W. Henley Publishing Co. Price $5.00.

This book begins with chapters of diesel definitions, diesel engine mathematics and fundamental engine cycles. Then follow discussion of fuel injection systems; combustion and heat distribution; rating, testing and performance; air intake and supercharging. This is followed by interpretation of diesel indicator diagrams, then a chapter on diesel fuel and lubricating oils, another on fuel properties and engine performance. In the appendix are tables of nomenclature, units and mathematics, discussions of combustion and heat distribution in the internal combustion engine, fuels, and tests in specifying lubricating oils.

One of the features of the book is the large number of illustrations and simple black and white diagrams illustrating principles, as well as details, of operation. Each chapter is followed by a selection of problems, many to be worked out mathematically to a quantitative solution.

This is one of the best books in the field, for it is devoted to fundamental principles of diesel engines and not primarily to details of specific makes of engines. The latter are well covered in other recent books and in catalogs of the various manufacturers. While the book is designed primarily as a textbook for class room use, the student working on his own will not find it too difficult for ready understanding.

Heat The Mass and You Heat All*

RADIANT HEATING by T. Napier Adlam. Size 6¼ by 9 in.; 500 pp; cloth binding; second edition. Published by The Industrial Press. Price $6.00.

THE RESULTS of more than 30 years experience in radiant heating, radiant cooling and extensive studies in snow melting are presented in this volume. It has been expanded to include additional material on ceiling panels: enclosed convector panels, gravity warm air panels, and forced warm air panels. The chapter on floor panels now covers floor panels in brooder houses and data on the psychological aspects of floor heating.

Important developments in electrical rubber panels, portable electric screens and radiant glass panels have been covered and added data are provided on embedding electric conductors in ceiling and wall plaster. Because of the great interest in snow melting and increased number of installations made for this purpose, this particular section has been enlarged to present practical information. A set of 78 working charts is presented for easy direct determination of pipe sizing necessary; these charts cover both iron and steel pipe and copper tubing.

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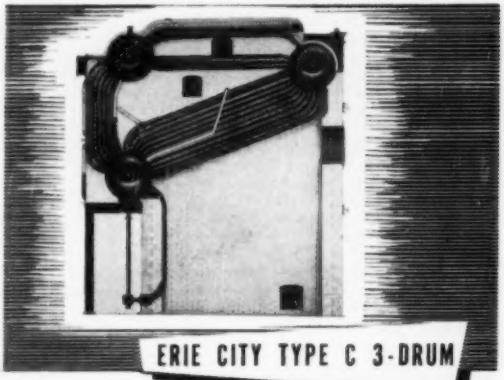

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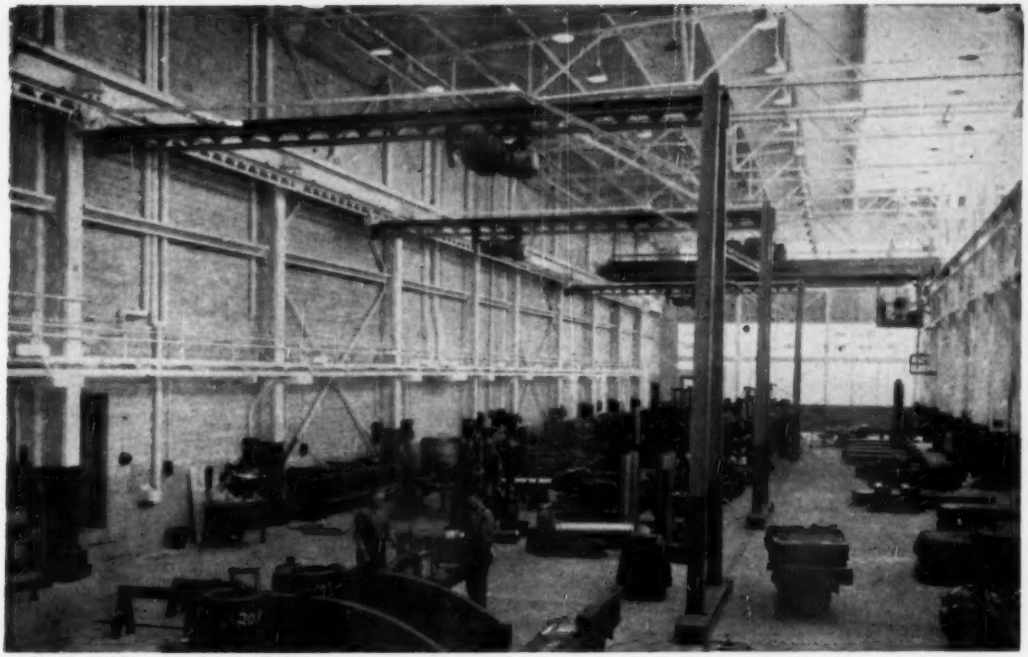

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